ARCHIVES OF OPHTHALMOLOGY.

CLINICAL CONTRIBUTIONS TO THE KNOWLEDGE OF RARE AFFECTIONS OF THE CONJUNCTIVA AND SKIN OF THE LIDS.

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[*With six colored figures on Plates I.–II. of Vol. XLII., 1–2 (1900), of the German Edition.*]

Abridged Translation by Dr. Ward A. Holden.

OF the following material, four cases were seen in the Würzburg University eye clinic and one in the Berlin University eye clinic.

Their great rarity apart, these cases should be of general clinical interest, since they exhibit an unusually typical character, and have scarcely been correspondingly represented pictorially elsewhere.

Case I. — **Retention cysts of the sweat glands of the skin of the face and lids.**

B. K., a woman of fifty-five. The patient states that for at least twelve years there has been unilateral sweating of the entire left side of the face and neck, particularly after active exercise, in hot weather, and after eating certain acid foods. For about this same period, vesicles have appeared on the lids and face and have become more and more extensive. With the increase in the number of vesicles, their size and consistency have increased, particularly in hot weather. When well filled, the vesicles cause itching, but otherwise no symptoms.

The skin of both lids of both eyes has sprinkled over it numerous contiguous, round, sharply circumscribed elevations from 1–4*mm* in diameter, filled with a watery liquid. The covering of the elevations is tense, and when pricked a watery drop escapes. The elevations are particularly numerous and large about the inner angle of the upper lid. The same elevations appear on the

skin of the forehead and down the face to the region of the lower jaw on each side. Otherwise the skin is of normal appearance.

On the left side of the face there are pronounced symptoms of paralysis of the oculo-pupillary fibres of the cervical sympathetic, namely, slight ptosis, enophthalmus, and myosis, the pupil scarcely dilating when the illumination is reduced, while the right dilates normally. Finally the tension is slightly reduced as compared with that of the other eye.

The further examination of the eye revealed R: myopia of 11. D, V = $\frac{1}{4}$; L: myopia of 10. D, V = $\frac{1}{3}$. In both eyes: beginning cataract, floating opacities of the vitreous, large temporal staphyloma, and incipient central chorio-retinitis.

Without doubt there was in this case an excessive sweating in connection with sympathetic paralysis. Later the vesicles appeared which are to be regarded as retention cysts of the sweat glands. After being pricked they soon refilled; only cutting them off or destroying the cyst wall prevented their recurrence.

The clinical picture here has a certain similarity to that frequently spoken of, particularly by English physicians, as dysidrosis or pompholyx or cheiro-pompholyx. Without symptoms of inflammation, there develop on the palms, soles, or other portions of the body vesicles varying in size from the head of a pin to a pea, which frequently coalesce to form large vesicles. Crops of these may recur for weeks. In some cases the contents are of a purulent character. Careful microscopic examination has shown with certainty that there is in these cases no blocking of the ducts of the sweat glands, but a localized inflammation in the papillary layer of the corium.[1]

CASE 2.—**Herpes facialis of the lower lid.** See Fig. 1, Plates I.–II.

In a woman of thirty, a redness and swelling of the right lower lid came on with her menses. About the middle of the right lower lid the skin was greatly reddened and swollen. In the middle of the inflamed area was a group of small vesicles, some discrete, others confluent, with purulent contents (Fig. 1). Some of

[1] *Cf.* Peterson, "Beiträge zur Kenntniss der Schweissdrüsen-Erkrankungen," *Arch. f. Dermatol. u. Syphil.*, 1893, p. 443.

these were already drying up and are depressed. The condition had lasted a day and a half when the patient was first seen. According to her statement the contents were at first of a watery character.

The drying became more marked, and yellow or brown crusts formed, depressed in the centre. Gradually the redness and swelling diminished, the crusts fell off, and in a week the skin appeared normal again.

In respect to the diagnosis, I need hardly say that in appearance and course this case corresponded completely to the herpes facialis which frequently appears on other portions of the skin, as, for example, the region of the mouth.

CASE 3.—**Eczema impetiginosum necroticum of the eyelids; later a chancre of the conjunctiva of the lower lid.** See Figs. 2–4, Plates I.–II.

An illegitimate female child of five developed an inflammation of the skin of the eyelids and part of the face two weeks before.

The eyelids are greally swollen, reddened, and exhibit an ulcerated surface. The entire lower lid is involved, and the ulceration extends beyond the lid both nasally and temporally and then circles round the upper lid (Fig. 2). The floor of the ulcer is partly covered with blood-stained brown and yellow crusts and partly is exposed and bleeds when touched. The ulcer has a sharp line of demarcation, particularly below. The nature and development of this ulcer were shown in the foci on the brows and face, which appeared partly as large and small pustules with dried-up contents, partly as round ulcers covered with crusts or weeping and suppurating. A diagnosis was made, therefore, of eczema impetiginosum of the face and lids, to which were added evidences of superficial necrosis of the right lids.

Agar cultures showed the presence of streptococci.

Conjunctiva and cornea were normal.

The anamnesis did not permit a conclusion as to whether the skin affection was perhaps not primary but one arising from an area previously affected with erysipelas.

Cicatrization advanced, and the floor of the ulcer became clean and covered with skin. The ulcerated surfaces assumed a light bluish-red color and the scars exhibited a whitish stippling (Fig. 3).

After the healing was finished in the course of fifteen days, suddenly an excessive watery secretion from the right eye was noticed, together with a marked injection of the tarsal conjunctiva of the right lower lid, and a small deep ulcer slightly external to the middle of the lid, that looked suspiciously like a chancre (Fig. 3).

This ulcer rapidly extended laterally and in depth, and there suddenly appeared a number of small round yellowish infiltrations in the palpebral conjunctiva, the fornix, and the bulbar conjunctiva (Fig. 3). On the bulbar conjunctiva there appeared also an excoriation corresponding in location to the ulcer of the lid when the eye was closed, and suggesting an inoculation by the ulcer of the lid. The affected area was of a dirty-gray color.

The original ulcer spread until the skin of the entire lid margin was involved (Fig. 4). The lashes fell out, and in the skin about the ulcer there appeared a great number of the same small round yellow infiltrations that had previously existed in the conjunctiva.

The middle of the right lower lid became gradually harder and more cartilaginous to the touch.

Two weeks after the appearance of the ulcer the preauricular and submaxillary glands on the right side began to enlarge. No other glandular enlargements were observed, and there was no eruption.

A diagnosis of chancre of the tarsal conjunctiva was made, and this was confirmed by Professor Seifert, whose report was as follows: "The affection, on account of its hardness and the typical sclerosing lymphadenitis, must be regarded as a primary syphilis. The injection must have occurred while the eczema existed, by the direct inoculation of the conjunctiva near the lid margin where it was denuded of epithelium. How this occurred could not be found out. The mother of the child has no manifest symptoms of syphilis, but there was a pronounced universal sclerosing lymphadenitis, which made a latent syphilis seem probable."

The treatment was begun with mercurial inunctions. After three weeks of this, the swelling of the lower lid diminished, the floor of the ulcer was covered with granulations, the infiltrations of the conjunctiva and skin had become smaller. The superficial ulcer in the temporal portion of the conjunctiva was healed. The cornea throughout remained normal. The local glandular swellings had decreased somewhat, but elsewhere there was extension of the swellings. No changes appear in the mucosa of the mouth and throat.

When last seen the middle part of the lid was still thickened, the lashes gone, the ulcer almost entirely cicatrized, and in its place a slight depression in the lid margin; the small infiltrations of the conjunctiva had become very small and those of the skin had disappeared.

The results of the inunction treatment also supported the diagnosis, and to this early treatment is to be attributed the non-appearance of an eruption.

The small round yellow infiltrations in the skin and conjunctiva are deserving of notice. The infiltrations on the conjunctiva were entirely similar to enlarged or new-formed follicles in the process of purulent degeneration. One must assume that the syphilitic virus was quickly diffused through the entire conjunctiva, and, as in trachoma, the expression of the infection consisted not only in an accumulation of leucocytes in the so-called follicles already existing but also in the formation of new ones. Similar infiltrations or nodules are found in the neighborhood of tuberculous ulcers of the conjunctiva. The nodules in the skin are to be regarded as similar localized infiltrations in the subcutaneous cellular tissue.

CASE 4.—**Syphilides of the skin and scleral conjunctiva.** Fig. 5, Plates I.–II.

W. A., a widow, aged forty-seven, states that she has had an inflammation of the left eye for a short time, and thinks it to be connected with severe pains located chiefly in the left forehead and side of the head.

On looking at the patient and considering her statements, one was at first inclined to regard the affection as a herpes zoster over the distribution of the first branch of the left fifth nerve, and the more so since the appearance and arrangement of the eruption on the left half of the face seemed to correspond to the picture of that affection (Fig. 5), yet a more careful examination revealed the presence of a slight eruption on the right half of the face and on other parts of the body.

In the vertical meridian of the left eye bordering the upper margin of the cornea was a round ulcer of the scleral conjunctiva, as large as a pinhead, with a purulent base, resembling the ulcer resulting from the breaking down of an eczema pustule. The margins of the ulcer were irregularly swollen, and the scleral conjunctiva was infiltrated over a considerable area and per-

vaded by greatly dilated vessels. About the ulcer and in the upper half of the scleral conjunctiva were numerous yellow infiltrations or nodules (Fig. 5).

The ulcer extended to the cornea and grew deeper, so that the superficial layers of the sclera and cornea broke down. There was a gradually increasing vascularization of the upper margin of the cornea about the ulcer. The aqueous was cloudy and there were deposits on the membrane of Descemet. The iris was scarcely discolored, the pupil dilated *ad maximum* under atropine, and the ophthalmoscopic examination revealed normal conditions in both eyes.

A general examination by Professor Matterstock led to the following diagnosis: sclerosis tonsillæ et arcus palatoglossi later. sin., angina luetica, condylomata lata faucium; syphilis cutanea papulo-squamosa, pustulosa, lenticularis et miliaris; polyadenitis.

Taking into account the general condition, the pustular ulcer of the scleral conjunctiva is to be designated as a papular syphilide becoming pustular, about which nodules formed of the same nature as those observed in Case 3.

Under inunction treatment the ulcer became clean, grew smaller, and healed without particular cicatrization. In three weeks' time all the other ocular symptoms disappeared and the signs of the disease elsewhere became less marked.

The same eruption appeared on the scleral conjunctiva that was found on the skin, and the fact that the pustular ulcer spread in lateral extent and in depth must be ascribed chiefly to the excessive anæmia and the reduced condition of general nutrition.

The development of nodules in the scleral conjunctiva about the ulcer is to be explained as in Case 3. The same explanation will account for the development of the iritis—that is, that a virus from the affected spot by means of diffusion acts upon the iris. In this case a diffusible poison extended in two directions, through the scleral conjunctiva and into the iris. In the former, the reaction of the tissues manifested itself in the appearance of nodules; in the latter, in the appearance of iritis and deposits upon the cornea.

Should further observations show that syphilitic disease of the conjunctiva, whether a chancre or a secondary eruption, is regularly accompanied by the formation of these nodules, the latter would be in doubtful cases of conjunctival

syphilis not only a valuable diagnostic sign, but the manner of their extension, the quickness of their appearance, the great number and the yellow color of the so-called follicles would permit the conclusion that the syphilitic virus not only is readily and quickly diffused in the conjunctiva, but also produces a severe reaction in its tissues.

CASE 5.—**Lues tuberosa serpiginosa of the skin of the lids, face, head, neck, thighs, and forearm that had run its course.** See Fig. 6, Plates I.–II.

W. H., a man of fifty-two; infection twenty-seven years before. Three or four years after infection, cutaneous eruption on both legs; ten years after, on both forearms; and three years ago, on the face, head, and neck.

The skin of head and neck exhibits a peculiar formation of cicatrices, consisting principally of broad white and moderately elevated tracts, forming a network (Fig. 6). In general these run, particularly in the face, in a vertical direction. In places the scars are broader and contiguous, having a great similarity to scars following burns. At the spots which are not cicatricial, the skin appears atrophic. On the neck the scars are considerably pigmented, but those of the head are only slightly pigmented. In general the skin is thin and velvety and is readily elevated. The right ear is deformed by cicatricial contraction.

The lids on both sides are involved, the right, however, more than the left. In the latter, the outer half of the upper lid is everted and the tarsal conjunctiva proliferated. Cilia are few in either lid. There is pannus of the cornea.

On the right side the entire upper lid and most of the lower lid are so everted that the entire tarsal conjunctiva with the retrotarsal fold appears as a uniform mucous membrane turned forward and lying in a single plane. It is swollen and hyperæmic. The upper lid is so displaced that the lid margin lies at the upper margin of the orbit, nearly in contact with the eyebrow. The latter is itself drawn upward (Fig. 6*A*) and is represented by a few long black hairs more or less vertical in direction. The cilia are reduced in number until only a few are visible near the middle of the lid margin.

The scleral conjunctiva of the right eye is even more swollen and œdematous than the tarsal conjunctiva and retrotarsal fold.

It is thrown up about the cornea and partly overlaps the latter so that only its centre is visible (Fig. 6).

The cornea has been transformed into a uniform grayish scar traversed by many vessels.

Similar cicatrices are found on the anterior surface of the legs, the inner surface of the forearms, and about the elbow-joints.

Professor Lassar regards the condition as lues tuberosa serpiginosa (gummata of the skin) which has run its course.

Explanation of Figures on Plates I.–II.

Fig. 1, Case 2.—Herpes facialis of the right lower lid.

Fig. 2, Case 3.— Eczema impetiginosum necroticum of the upper and in part of the lower lid, with eczema on other parts of the face.

Fig. 3, Case 3.—Cured eczema impetiginosum necroticum of the upper and lower lids, with a chancre of the conjunctiva of the lower lid, a secondary ulcer on the corresponding part of the scleral conjunctiva, and numerous nodules scattered through the entire conjunctiva.

Fig. 4, Case 3.—The same as in Fig. 3; the lower lid margin transformed into an irregular scar with many subcutaneous nodules about it.

Fig. 5, Case 4.—Pustular syphilide of the face and scleral conjunctiva, with nodules in the conjunctiva about the ulcer.

Fig. 6, Case 5.—Healed lues tuberosa serpiginosa of the right half of the face, with consecutive ectropium of the lids. The swollen scleral conjunctiva surrounds the cicatricial cornea in a fold.

A indicates the elevated right brow recognizable from the presence of isolated hairs in the middle portion. The margin of the upper lid has been drawn up nearly to this point and exhibits a few remaining cilia.

EPIPHORA AS AN INITIAL SYMPTOM OF BASEDOW'S DISEASE.

By Dr. E. BERGER, Paris.

Slightly Abridged Translation from Vol. XLVI., 2 (1902), German Edition, by Dr. Ward A. Holden.

IT is known that in the beginning of Basedow's disease in many cases there is epiphora which annoys the patient very much. In exceptional cases the epiphora may become so troublesome at night as to disturb the patient's rest. Such cases have been reported by Schoch and Koeben, Fischer, Bäumler, Roth, and Shingleton Smith.

Most authors, Schmidt-Rimpler for example, agree with Sattler that epiphora in Basedow's disease is due to two causes: 1, the wide palpebral aperture permitting the irritating atmospheric air to affect a great part of the anterior portion of the ball and thus excite an increased flow of tears; 2, the infrequent and incomplete closing of the lids, which leads to an imperfect carrying off of the tears. Other authors, for example Knies, believe that the epiphora is due to irritation of the sympathetic.

That the former explanation is not applicable to all cases is shown by two observations which I reported in 1893 (*Bulletin méd.*, No. 21, p. 241). In these cases the epiphora long preceded all other symptoms of Basedow's disease. Since then I have observed two other cases in which there was epiphora before the symptoms of a wide palpebral aperture or of infrequent winking appeared. The cases in which epiphora appeared as the initial symptom of Basedow's disease present so many interesting clinical features that it seems justifiable to report them.

CASE 1.—Frau Ch., aged fifty-five, of medium stature, greatly emaciated. No nervous diseases known in her family. Three years before, after a great sorrow, epiphora began, which led her to consult one after another a number of ophthalmologists here. In spite of the slitting of the canaliculus and probing, given up and repeated again, no improvement was obtained.

In October, 1892, the patient came to consult me in regard to the epiphora. There was bilateral exophthalmus which the patient stated had developed gradually recently. On each side there were blepharadenitis and injection of the conjunctiva. Pupillary reaction, accommodation, acuteness of vision, ophthalmoscopic appearance (except for arterial pulsation), normal. It was not possible to determine the field of vision. There was palpitation of the heart. Cardiac dulness increased, tachycardia, a feeling of anxiety, insomnia, increased sweating, and twitching of the extremities which had increased until the patient was unable to write. All these symptoms appeared later than the epiphora which persisted, although the probe passed readily through the nasal duct. The thyroid was but slightly enlarged.

Faradization of the sympathetic according to Vigouroux's method and the constant current (anode on the nape of the neck, kathode on the closed lids) were tried for several sittings without any perceptible result. At the same time a neurologist instituted the proper general treatment, but this was not continued long, since the patient was in the habit of changing physicians and methods of treatment frequently. Indirectly I learned that the patient gradually weakened and died.

CASE 2.—R., aged fifty-six, a merchant, of medium size, strongly built. No nervous diseases in the family. A chancre at the age of seventeen, cured by mercurial injections continued for months. At the age of forty-seven, diplopia came on and mercury and iodide of potassium were used freely. In three months the diplopia passed off. Since then the patient makes mercurial inunctions for a time each year and no manifestations of syphilis have appeared.

Four years ago he noticed epiphora in both eyes, which from time to time increased. He found no cause for this, but supposed it to be connected with a mentally depressing experience. An oculist who was consulted at that time split one canaliculus and passed sounds on each side daily. This treatment having pro-

duced no result in two weeks, the patient went to another oculist and then to others, employing all the usual methods of treatment, such as astringent injections, probing, etc. It was now supposed that the epiphora was due to reflex excitation from another organ and rhinologists were consulted, who stated that they did not believe the epiphora to be due to pathological changes in the nose. It was then proposed to the patient that the epiphora might be cured by the extirpation of the palpebral lachrymal glands. He did not consent to the operation and gave up all treatment.

Four years after the epiphora began he came to me because he had noticed that for some time both eyes protruded slightly. When I first saw him I found a slight exophthalmus, more pronounced on the left side than on the right. While the patient was relating his history he was constantly obliged to wipe away the tears.

On each side the tendon of the levator was retracted, Graefe's symptom, which was not well marked but later became clearly evident. Winking infrequent, slight inflammation of the lid margin and conjunctiva. Pupils of average width and reacting to light and in convergence. Acuteness and fields of vision and ophthalmoscopic appearance normal. A Bowman's probe No. 6 could readily be passed on either side.

On questioning the patient I learned that he had noticed palpitation of the heart for some time but paid little attention to it. The pulse was over 100, and he complained of a feeling of heat and increased sweating.

I regarded his condition as a case of beginning Basedow's disease, of which epiphora was the initial symptom. For general treatment I referred him to a neurologist. The general condition improved, and with this the epiphora became less annoying.

Case 3.—Mrs. R., aged fifty-six, small, of robust figure, and anæmic appearance. Parents died early; four brothers and three sisters healthy. Married at the age of seventeen, and had nine children. One died at the age of two and one at the age of four from convulsions, one from cholera, and one from an infectious disease while in the military service. A daughter was under my care for a convulsive tic.

Three years ago, while grieving over the death of a son, a number of nervous symptoms appeared: disturbed feeling, insomnia, asthenopia. For two years the patient has had attacks of fainting and difficulty in breathing. For a year there has been

severe palpitation of the heart, a feeling of pressure on the breast, and a feeling of anxiety. Epiphora has existed since the beginning of her illness, appearing at times, often being very troublesome, and always affecting both eyes.

The palpebral aperture and the frequency of winking are not abnormal. There is no exophthalmus; Graefe's symptom. Binocular convergence difficult. In order to read at 33*cm* the patient requires + 1.5 combined with prisms. Pupils, fields, and fundus normal. R V = $\frac{20}{20}$, L V = $\frac{20}{20}$. Lachrymal passages normal. Heart-beat strong, the apex beat to be felt as far as the anterior axillary line; systolic murmurs; pulse, 100–105. Marked pulsation of the carotids. Pronounced sweating and annoying polyuria.

Case 4.—H. S., aged forty-seven, tall and haggard. In childhood he had measles and varicella, and was always neurasthenic. In 1894 he had influenza, followed by symptoms indicating empyema of the left frontal sinus, but not necessitating surgical procedures.

In 1896, suddenly, epiphora began in the right eye, while the patient was riding on a car. When examined the following day I found no epiphora nor any other anomaly of the eye. Since then, at intervals, two attacks of dacryorrhœa have come on, which led me to believe that there was a secretory neurosis of the lachrymal gland. An examination of the nose revealed nothing abnormal, and there were no symptoms of tabes (there had never been syphilis) or of hysteria.

The attacks of dacryorrhœa continued without any accompanying symptoms up to the year 1899, usually in the right eye, sometimes in the left, and often in both eyes together. Their intensity and duration varied greatly. I observed one attack in which the tears flowed drop by drop down over the right cheek.

On December 2, 1899, the patient had a severe emotional shock. The following night he was sleepless and had palpitation (which he had had earlier), marked pulsation of the carotids, epiphora, and polyuria. Then gradually the typical picture of Basedow's disease developed: tachycardia (pulse, 100–120), arythmia, vertigo, difficulty in breathing, a feeling of anxiety. After bodily exertion he had a feeling of heat and increased pulse. His sleep was disturbed, and he frequently awoke with pulsating carotids and tears in the eyes. Frequent examination of the eyes revealed nothing abnormal. There was present neither Graefe's

nor Stellwag's symptom, binocular convergence was difficult, and reading tiresome. Exophthalmus was never observed.

In consultation with the attending physician I was unable to convince him that this was a *forme fruste* of Basedow's disease, but later he agreed in the diagnosis when, in the spring of 1900, a swelling of the thyroid became manifest. The treatment consisted in cold applications to the region of the heart, iodide of potassium, psychical hygiene, and abstinence from alcohol and tobacco, by which the condition was greatly improved. The palpitation passed off gradually, and at the same time the epiphora became less frequent and intense. Since then, excessive exercise had brought on occasional relapses, but in general his condition has been good.

In all the cases observed by me, the epiphora appeared without any other symptoms in the eye or other organs which could explain it, and the usual signs of Basedow's disease came on years later.

Professor Verneau and Dr. Diamantberger have described similar cases to me.

It is evident that in these cases the epiphora is not due to excessive width of the palpebral aperture (retraction of the levator, exophthalmus), which, though allowing the exposure of a greater portion of the ball to irritating influences, might cause epiphora; nor is this due to the infrequency of winking, since in every case the epiphora preceded this symptom.

Furthermore, the epiphora may continue even after the exophthalmus has passed off. An interesting case of this sort was observed by MATHIEU.

L. N., aged twenty-five, an engraver. His father died of heart disease; his mother is still living, but has goitre. As a child, the patient suffered from convulsions. At the age of 4–5 years, there was transitory convergent strabismus of the left eye.

At the age of fifteen, the patient noticed the first symptoms of Basedow's disease. The exciting cause was emotional excitement due to his narrow escape in a fire.

At the time of examination, there was twitching, diarrhœa, tachycardia; pulse 100, irregular, and intermittent. For five

years there has been no exophthalmus, but the epiphora continues as before. The eyes are constantly bathed in tears, yet these rarely flow down the cheeks. The epiphora came on with the exophthalmus.

In these cases the epiphora is to be regarded as a secretory neurosis of the lachrymal glands similar to the other secretory neuroses found in Basedow's disease, such as increased sweating, polyuria, etc. The lachrymal gland is innervated by the facial, to which is attributed the increased secretion from psychical causes, and the sympathetic. The weeping, caused through the fifth nerve, is to be explained as being due to a reflex conduction of sensory excitation to the sympathetic vasomotor fibres in the glands.

The acceptation of a vasomotor neurosis to explain the epiphora in Basedow's disease accords fully with the usual interpretation of a series of symptoms in this disease as being due to the sympathetic (Koeben).

The diminished secretion of tears which is noted in most cases of Basedow's disease, particularly when of long standing, has not yet been satisfactorily explained.

Von Graefe believed the diminution of the lachrymal secretion to be due to compression of the gland from the exophthalmus. Sattler supposed that on the one hand the diminished sensibility of the cornea and conjunctiva lessened the reflex secretion, and that on the other the extent of the eyeball exposed led to a more rapid evaporation of the tears, and hence decreased the moisture of the ball.

A case of Basedow's disease in a woman of fifty-two which I observed, in whom the unpleasant symptom of dryness of the eye appeared as the exophthalmus improved, seemed to indicate that in certain cases at least a diminution of lachrymal secretion and not an increased evaporation gives rise to the sensation of dryness.

Anatomical examinations of the lachrymal glands in Basedow's disease are, so far as I know, entirely wanting. It would be interesting to learn whether the changes in the lachrymal glands in dacryorrhœa, which are essentially similar to the changes found by Klippel and Lefas in the sali-

vary glands in the sialorrhœa of tabic patients, also exist in Basedow's disease. These changes consist in a fatty degeneration and necrosis of the gland cells, circumlobular sclerosis, and mild inflammatory changes in the ducts of the glands. The adherents of the toxic theory of Basedow's disease may explain the diminution of lachrymation by assuming toxic changes in the nerves of the glands.

The cases of Basedow's disease with epiphora as an initial symptom are rare, yet in many cases the early appearance of epiphora, followed later by the other symptoms, may have been overlooked. From a diagnostic standpoint the epiphora, so long as other symptoms do not exist, offers nothing characteristic. But when to an epiphora is added tachycardia, marked pulsation of the carotids, and the like, as in my Case 4, the ophthalmologist may render considerable service by early recognizing the existence of the general disease, as the results of treatment are better the earlier the diagnosis is made.

It is evident that in the treatment of epiphora when it is a secretory neurosis, sounds and astringent injections are not to be used. Nor even in obstinate cases would I extirpate the palpebral lachrymal gland when the appearance of other symptoms showed that Basedow's disease existed, for there is frequently diminution in secretion in the later course of the general disease, and this operation would cause the annoying feeling of dryness in the eye to become more manifest. I have had no experience in the local use of the constant current. The most important thing is the general treatment whereby the different symptoms of Basedow's disease, as well as the epiphora, are improved (*cf.* Cases 2 and 4). In very obstinate cases perhaps instillations of cocaine into the conjunctival sac might be tried, or the internal use of atropine, which, as we know, reduces the secretion of acinous glands.

For the annoying dryness of the surface of the ball I suggested in 1894 the replacing of the lachrymal liquid with sterilized salt solution instilled several times a day into the conjunctival sac, and this has been used with good result by others as well as myself.

EXPERIMENTS ON ENDOGENOUS INFECTION OF THE EYE.

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FROM THE CLINIC OF PROF. L. BELLARMINOFF.

Translated from *Arch. f. Augenheilk.*, xlvii., April, 1903, by Dr. Matthias Lanckton Foster.

THE subject of endogenous infection of the eye, indeed of endogenous infection in general, has been studied only recently in a truly scientific manner. Long before the discovery of bacteria, clinical observations were made which indicated endogenous infection as the presumable cause of certain diseases of the eye, and, simultaneously with the perfecting of the microscope, in the middle of the nineteenth century, pathological and later bacteriological investigations of the subject were instituted. But experimental study dates back only five years, the number of workers is limited, many aspects have not as yet been touched upon, and so we have undertaken a series of experiments in the hope of throwing some light upon the obscurities of a subject so important in the pathology of the eye. In order to make the purpose of our work clear, we quote not only the experimental work which has already been done, but the ascertained clinical and anatomical facts as well. The latter we mention briefly because they have been sufficiently elaborated in the writings of Axenfeld, Herrnheiser, and others.

CLINICAL FACTS.

Clinical experience leads to the classification, on the one

hand, of general and local infections which endogenously cause eye diseases, and, on the other, of the forms in which the latter appear. The first observations, at the beginning of the nineteenth century, were made in regard to disease of the eye from puerperal infection. In the course of fifty years, similar cases were reported as the results of pyæmia of all kinds, caries of bone, and umbilical phlebitis, and with the better understanding of general infectious diseases came the knowledge that they, too, can cause eye troubles. It is now known that there is no general infection in which resultant diseases of the eye have not more or less often been observed; they have been seen in erysipelas, acute exanthemata, diphtheria, typhoid, typhus, relapsing fever, influenza, acute and chronic rheumatism, tuberculosis, lues, lepra, malaria, epidemic meningitis, Weil's disease, etc. It is also known that endogenous disease of the eye may be caused by bacterial diseases of single organs, such as croupous and broncho-pneumonia, purulent bronchitis and pleurisy, fibrino-purulent endo- and pericarditis, otitis media, catarrh of the stomach and of the bladder, and gonorrhœa. In 1888 Ewetzky reported a case of panophthalmitis due to endogenous infection from a paronychia.

Some writers attribute to endogenous infection, in spite of the absence of a general or local infectious disease, the severe purulent inflammations which sometimes follow the formation of anterior synechiæ after ulcerative keratitis, iridectomy, or cataract extraction, especially when associated with a cystoid cicatrix. The idea is that these inflammations arise through endogenous infection of the scar as the place of least resistance, and is based on the fact that in many cases it has been impossible to demonstrate any external lesion even with the microscope and ectogenous infection was thereby excluded, but the location of the focal point in these cases has not yet been determined.

Panas goes farther and thinks that plastic and serous inflammations of the uvea and retina can be caused by the transmission of microbes from any part of the body, such as the intestinal canal or the urinary organs, when the appearance of the eye is normal and the general health seems

to be good. Even if this is going a little too far we must not forget that the cause of idiopathic iritis is still unknown.

The forms in which endogenous infection of the eye appears may be divided into diseases of the eyeball and optic nerve, and diseases of the surrounding tissues, such as paralyses of the extrinsic muscles, and inflammation of Tenon's capsule. The first group includes functional troubles, such as paralysis of the accommodation, amblyopia, and amaurosis without organic changes, as well as the far more important inflammatory diseases, iritis, irido-cyclitis, irido-choroiditis, iritis with the formation of nodules in syphilis, tuberculosis, and lepra, various forms of choroiditis and retinitis, papillitis, neuroretinitis, retrobulbar neuritis, and finally the very malignant metastatic ophthalmia. Therefore all the endogenous diseases of the eye as yet observed can be otherwise divided into two groups, the mild forms which end in complete recovery and the severe ones which result in loss of sight; between these extremes are transition forms which cause a greater or less functional loss. In this connection it is noteworthy that the mildest as well as the most severe inflammation of the eye can be excited by each of all the general and local infections with no reference to their severity.

These are the results of clinical observation. They leave many things obscure. The manifold nature of these diseases, with their varying courses and results, seems to indicate that almost all known diseases of the eye can be produced by the introduction of bacteria. The action of toxines and the weakening of the tissues as the consequence of general infection may be thought of, but even if we grant that all functional disturbances of the eye arise thus indirectly, there remain many inflammations which must be ascribed with probability, though not with certainty, to endogenous infection with bacteria on account of their clinical course. Clinical observation gives just as little certainty as to the precise manner of origin of infections of the eye, the primary local point of infection, the cause of the varying severity of the inflammations, or the conditions on the part of the eye or of the general system which favor or hinder endogenous

infection. Some of these points were partially cleared up by the pathological and bacteriological investigations.

PATHOLOGICO-ANATOMICAL AND BACTERIOLOGICAL FACTS.

In 1856 Virchow ascribed the cause of metastatic ophthalmia to capillary embolism from the pathological conditions he found to be present in a case of this nature. This was soon confirmed by many other investigators, who all, as well as Virchow, found in the emboli certain little bodies which were very resistant to the action of various chemical reagents. Heiberg pronounced them to be bacteria in 1874 and later studies proved him correct.

These investigations refer almost entirely to metastatic ophthalmia, or endogenous purulent panophthalmitis. Besides purulent, or fibrino-purulent infiltration of the tunics of the eye, emboli are usually found in the vessels, especially the fine capillaries, formed from fibrin, pus cells, and bacteria, or from the last alone. Inflammatory and necrotic changes, sometimes destruction, are almost always to be seen in the walls of the thrombosed vessels, and bacteria can always escape into the neighboring tissue, so that a thrombosed capillary often becomes the starting-point of an abscess. The constant presence of emboli containing bacteria, and the inflammatory reaction in their neighborhood, indicate that the formation of these emboli is the immediate cause of the disease of the eye.

The sources of capillary emboli are septic endocarditis and thrombophlebitis, the conditions which favor their formation are previous thrombosis without bacteria in the vessels of the eye, various degenerative processes in the vessel walls, and the smallness of the vessels themselves, with absence of collateral circulation in the retina. When bacteria are found in vessels with unchanged walls they have been circulating in the blood, in Axenfeld's opinion, and they sometimes multiply *post mortem.*

Whether bacteria can escape into the neighboring tissue through apparently unharmed vessel walls has not been determined by researches of this nature.

With regard to the location where the primary embolism occurs few observations have been or can be possible, because a microscopical examination is usually made on eyes which have been destroyed by inflammation, and then there is no possibility of finding the primary focus. In the paper of Axenfeld, 46 cases of metastatic ophthalmia are collated in which the primary focus was determined: in 21 it was in the retina, in 18 in the choroid, in 5 in these tissues conjointly, and in only 2 in the iris. Almost all authors agree that the choroid and retina form the usual starting-point in the severer forms of endogenous infections of the eye.

Relatively few observations have been made as to the character of the bacteria found in the eye if those obtained through cultures are considered alone as unquestionable. Axenfeld quotes 50 cases in which the results had been thus obtained: in puerperal and pyæmic metastatic ophthalmia, streptococcus pyogenes was found 21 times, staphylococcus pyogenes 8 times; in diseases of the eye caused by cerebro-spinal meningitis and croupous pneumonia, Fraenckel's diplococcus was found 8 times; in 2 cases due to typhoid fever, Ebert's bacillus was found; in 1 from typhus, a bacterium similar to that described by Hlava; in several from influenza, Pfeiffer's bacillus. Some authors, on account of the negative results of their investigations, ascribe the origin of the endogenous disease, in certain cases of septic retinitis and purulent inflammations, to the entrance of toxines made by bacteria elsewhere in the body. Such a theory is *a priori* admissible, but it must be considered that the absence of bacteria was asserted by some of these authors after microscopical examination alone, and also that in some cases of septic retinitis bacteria are found in the eye. Yet a few cases of endogenous eye disease have been reported in which the absence of bacteria was demonstrated by cultures as well as by the microscope.

The important facts learned from investigations of this nature may be thus stated:

1. The cause of the worst form of endogenous eye disease, metastatic ophthalmia, is the formation of bacterial emboli in

the vessels of the eye, principally in those of the retina and choroid.

2. All organic changes in the vessel walls which facilitate the formation of capillary emboli are to be considered factors favorable to the commencement of an endogenous infection of the eye.

3. In some cases the bacteria which caused the general infection have been found in the eye, an indubitable proof of the endogenous character of the disease.

4. It is evident that these methods of investigation can play only a limited part in the elucidation of this subject. They can very rarely, if ever, be applied to mild forms of disease, or even to some forms which are destructive to vision, and yet these occur much more frequently than metastatic ophthalmia.

PREVIOUS EXPERIMENTS.

In 1864, Weber observed a suppurative metastatic iridochoroiditis in two cats after injection into their blood of unfiltrated pus from a suppurating joint. Microscopic examination of the enucleated eyes revealed capillary embolism in the ciliary bodies and retinæ. Twenty years later, Marchand obtained an almost identical result from the injection into the blood stream of a pure culture of pneumonia diplo-bacillus. In 1897, Ewetzky described a case of serous irido-cyclitis in an ass, which appeared two weeks after the experimental production of relapsing fever. The case recovered, hence no microscopic examination was made.

These partially accidental observations apparently brought nothing new to light, but when we consider the great number of experiments made with regard to general infection it is quite evident that general infection alone will rarely cause endogenous disease of the eye.

During the last five or six years, several attempts have been made to obtain a suitable and simple method of investigation of endogenons affections of the eye, not to produce metastatic ophthalmia, but to study the conditions which favor the entrance of bacteria. The first attempt in this direction was made by Panas, who injected three rabbits

intravenously with pure cultures of bacillus coli or pyocyaneus, and either before or after the injection instilled some drops of nicotine and acetic acid into the eye. In every case he was able to find the injected bacilli in the aqueous, and came to the conclusion that bacteria circulating in the blood can easily enter an irritated or inflamed eye. Moll's experiments in regard to the passage of bacteria from the blood into the anterior chamber gave these results: In a normal or unirritated eye the bacteria penetrated into the aqueous only when there was a very severe general infection, and in only 23 % of such cases. In eyes irritated by the introduction of foreign bodies, or croton oil, or by the cauterization of the limbus corneæ, the bacteria appeared in the aqueous in 78 % of the experiments, even when a weak culture had been used. In the successful experiments the number of microbes found in the aqueous of the irritated eyes was much greater than that found in the aqueous of those which were normal. The bacteria in the anterior chamber caused no clinical symptoms, whence Moll concluded that they had retained their vitality but not their pathogenic power.

One of us, Selenskowsky, undertook some experiments in 1899 and 1900, published elsewhere, to ascertain if possible, among other things, whether irritation of the eye really favored the entrance of bacteria into the aqueous; whether microbes circulating in the blood pass also into the vitreous; and how to explain the absence of clinical inflammatory ocular symptoms in spite of the presence of bacteria. Moll's observations in regard to the influence exerted by mechanical, chemical, thermic, and electric irritations of the eye upon the frequency of entrance of bacteria into the anterior chamber and the number of bacteria found therein were confirmed by every one of the experiments. The frequency with which bacteria were found in unirritated eyes was about 30 %; in the irritated, about 80 %. In none of these experiments did the bacteria in the anterior chamber produce any visible changes.

Taking into account corresponding researches, this writer decided that the number of bacteria which gain entrance to

the aqueous is proportionately small; that their virulence, as compared with that of the injected culture, is greatly diminished; and that they escape very quickly from the anterior chamber, for the most part within twenty-four hours. Perhaps the early commencement of phagocytosis is to be added to the limited number of bacteria and their rapid removal in the lymph stream through the filtration angle to account for this quick escape. These are conditions which give the bacteria that enter the anterior chamber, so to speak, no time in which to exhibit their virulence, even though their pathogenic power as well as their vitality has been retained.

In none of the experiments was the passage of bacteria from the blood into the vitreous observed, but, as shown by the experiments of Bach, the vitreous must be acknowledged to be a favorable soil for the stay and development of bacteria on account of the very weak lymph circulation. In all these experiments cultures of moderate virulence were used in moderate quantities, so that none of the animals died from the infection.

OUR OWN EXPERIMENTS.

Our experiments were undertaken to try to answer these questions:

1. Is it possible under any conditions to force bacteria circulating in the blood into the vitreous?
2. If it is possible, do they enter from the anterior part of the eye or from the general circulation?
3. How do they enter each part of the eye?
4. Does the apparent absence of clinical changes as the result of the presence of bacteria in the anterior chamber correspond to absence of any microscopic lesion? If such a lesion exists, of what sort is it?
5. Is it not possible by modification of some conditions in our experiments to induce the production of clinical changes in the eye?

Questions 1 and 5 give rise to these additional questions:

6. What is the effect of irritation not only of the anterior but also of the posterior part of the eye?

7. What effect is produced by the injection into the blood of greater and lesser quantities of the same culture, and what by injections of cultures of greater or less virulence?

We considered that the influence of irritation of the eye upon the passage of bacteria into the anterior chamber had been fairly settled and therefore made no comparative experiments in that direction, although in all cases we examined the aqueous for the presence of bacteria.

Forty-seven experiments were made on rabbits and cats, thirty-nine with, eight without, irritation of the eye. Both eyes were irritated in three cases, in all the others one eye was left to serve as a control. The irritation of the anterior part of the eye was excited by cauterization of the limbus corneæ, by the introduction, in three cases only, of a piece of steel into the anterior chamber without injury to the iris, or by causing a prolapse of the iris. In the posterior part of the eye a foreign body was introduced into the vitreous through the smallest possible opening, and only when this caused no bleeding, as determined not only by a careful ophthalmoscopic examination, but also finally by a microscopic, was the experiment considered successful. To obviate the objection that the bacteria might enter the vitreous through vessels cut in introducing the foreign body, in some of the experiments the general infection was induced several days later.

The following bouillon cultures of various ages and virulence were used to induce the general infection: in thirty-five experiments the α variety of bacillus pyocyaneus, in nine the staphylococcus pyogenes aureus, and in three the streptococcus pyogenes. The original virulence of the first two cultures was such that 1*ccm* of a one-day's culture to a kilogram in weight killed a grown rabbit in about twenty-four hours. The weakening of these bacteria was accomplished by repeated inoculations in bouillon-peptone-agar, or by a prolonged stay in an incubator. The virulence of the streptococcus culture was such that 1*ccm* of a one-day's culture to a kilogram produced no severe symptoms beyond a rise of the temperature to 40° C. The cultures were injected into a vein in the margin of the ear in rabbits, into a super-

ficial vein of the lower extremity in cats. The quantity injected was from 2 to 4*ccm* each time.

The inoculations from the aqueous and vitreous were obtained, after intervals of time varying from one to ninety-seven hours, by means of a Pravaz syringe, in quantities of from 0.1 to 0.2*ccm.*, and were made on Petri's dishes. In some experiments we examined microscopically a portion of what was withdrawn from the aqueous and vitreous for the presence of bacteria and of phagocytosis. Repeated inoculations from the blood were also made. At the end of the experiment the animal, if living, was killed and inoculations were made from the liver, spleen, kidneys, brain, and blood of the heart. Whenever the presence of bacteria was demonstrated in the aqueous or vitreous, the eye was enucleated after a varying period of time, hardened, embedded in celloidin, cut into sections, properly stained, and examined with the microscope.

Our work may be divided into five sections, which correspond to the questions above stated.

1. General infection with antecedent, simultaneous, or subsequent irritation of the anterior portion of the eye.
2. General infection with irritation of the posterior portion of the eye.
3. General infection with simultaneous or consecutive irritation of both portions of the eye.
4. General infection without irritation of the eye.
5. Microscopic examination of the sections of the hardened eyeballs.

EXPERIMENTS WITH IRRITATION OF THE ANTERIOR PORTION OF THE EYE.

Twenty-one rabbits were experimented on in this manner. Three of these died before any inoculations were made; in sixteen, frequently repeated examinations of the vitreous with inoculations and the microscope from two to seventy-two hours after the production of general infection failed to reveal any trace of bacteria, although they were present in the aqueous in several cases; in two, positive results were

obtained. As the last are of much interest, the experiments will be briefly detailed.

Experiment A.—Rabbit, weight 1.5 kilo. Cauterization of the left limbus corneæ. Half an hour later, intravenous injection of 1.5*ccm* of a one-day-old culture of bacillus pyocyaneus of moderate virulence.

Inoculations from the blood after fourteen, nineteen, twenty-four, and thirty-seven hours, from the aqueous of both eyes after twenty-four hours, and from the vitreous of both eyes after twenty-four and one half hours, gave negative results. After thirty-seven and one half hours, inoculations from the left aqueous, and after thirty-eight hours from the left vitreous, resulted in innumerable colonies of bacillus pyocyaneus, while those from the right eye were negative.

Experiment B.—Rabbit, weight 1.4 kilo. Cauterization of left limbus corneæ and a part of the cornea. Half an hour later intravenous injection of 3*ccm* of a one-day's culture of bacillus pyocyaneus.

Twelve and twelve and one half hours later, inoculations from and microscopical examination of the aqueous from both eyes and of the vitreous of the right eye gave negative results, while the bacillus pyocyaneus was demonstrated to be in the left vitreous. Under the microscope free bacilli were seen with a sparse quantity of mononuclear leucocytes. At the end of twenty-four hours, the animal showed symptoms of a severe general infection and was very weak. Inoculations showed bacilli in the aqueous of both eyes, while the microscope revealed none in the right, and four or five free bacilli in the left. Inoculations from the vitreous of each eye at the end of twenty-five hours showed bacilli in both; the microscope revealed none in the right, but many free bacilli and mono- and polynuclear leucocytes in the left. Death occurred from the general infection at the end of thirty hours.

In this group of experiments what caused such a very small number of positive results? There are three possible answers: 1. That the bacteria injected into the blood disappear so quickly that they have, so to speak, no time to pene-

trate into the vitreous; 2. That the microbes which had entered the eye had escaped before any of the vitreous was taken out; 3. That for some reason the vitreous shows little attraction to bacteria, even when they are circulating in the blood. The first two of these possible answers are evidently excluded in most cases, not only in this group of experiments, but also in the two following. Experiment A, and other experiments as well, showed that the bacteria can disappear from the circulation and subsequently enter the eye, apparently from some inner organ. In Experiment A the bacteria were found in the vitreous of the irritated eye alone, but in Experiment B they were found in the vitreous of both eyes, though earlier in that of the irritated one, so that the entrance of the microbes into the sound eye, and perhaps also into the other, is to be ascribed rather to the virulence of the culture employed than to the irritation. This idea is supported by the results of some of our other experiments.

From this group we draw the following conclusion:

With a weak or moderate general infection, the passage of bacteria circulating in the blood into the vitreous is much impeded by some conditions present not only in normal eyes but also in those in which the anterior segment has been irritated, a condition which highly favors the entrance of the same bacteria into the aqueous.

EXPERIMENTS WITH IRRITATION OF THE POSTERIOR PORTION OF THE EYE.

For these seven experiments on rabbits bouillon cultures of bacillus pyocyaneus of varying virulence were used. A foreign body was introduced into the posterior part of the eyeball. In five of these experiments from 1 to 1.5*ccm* of a one to four days' culture was injected, a comparatively mild general infection was produced, and the results of the examinations of the vitreous were negative. In two experiments positive results were obtained. In one of these a successful inoculation from the vitreous of the injured eye was secured after twelve and a half hours, at which time the

aqueous of the same eye, as well as the aqueous and vitreous of the other eye, was found to be sterile. The other was as follows:

Experiment C.—Rabbit, weight 2.4 kilo. Introduction of a piece of steel into the left vitreous. Three days later, intravenous injection of 2*ccm* of a two-days' culture of staphylococcus pyogenes aureus. On the following day severe general infection, positive results from inoculations from the blood and left vitreous, negative from the right vitreous and the aqueous of both eyes. Death in twenty-seven hours. Positive results from inoculations from the liver, spleen, kidneys, medulla, and blood of the heart.

In these two cases the bacteria entered into only the wounded portion of the injured eye. This probably indicates that irritation of the posterior part of the eye favors the passage of bacteria into the vitreous, but such a passage occurred only in connection with a severe general infection. It may therefore be asserted that even in the presence of irritation of the posterior portion of the eye the passage of bacteria from the blood into the vitreous is greatly impeded when the general infection is mild or of moderate degree, and that a certain degree of severity of the latter is necessary to cause such irritation to favor effectively the passage of the bacteria.

EXPERIMENTS WITH IRRITATION OF BOTH PORTIONS OF THE EYE.

Eleven of these experiments were made. Six failed to show a passage of the bacteria into the vitreous. In these 1.5 to 2*ccm* of a one to three days' culture of bacillus pyocyaneus, or 1 to 1.5*ccm* of a three-days' culture of staphylococcus pyogenes aureus, were injected without producing severe general infection. In the five successful experiments the culture of bacillus pyocyaneus alone was used in four, while in the remaining one the same culture was used at first and later a culture of staphylococcus pyogenes aureus. In three of these the presence of the bacteria was demonstrated in the injured eye alone, twice in both aqueous and vitreous, once only in the vitreous; in the other two they were pres-

ent in the other eye as well. The last two and one of the others seem worthy of a more detailed description.

Experiment D.—Rabbit, weight 1.6 kilo. Introduction of a foreign body into the posterior portion of the left eye. Immediate intravenous injection of 1.5*ccm* of a one-day's culture of bacillus pyocyaneus. Inoculations from the blood and the aqueous and vitreous of both eyes after twenty-four, forty-eight, and seventy-two hours gave negative results. Three days after the beginning of the experiment, the lower half of the limbus corneæ was cauterized and 2*ccm* of a one-day's culture of bacillus pyocyaneus were injected. On the next day there was haziness of the left cornea with little fibrinous deposits in the anterior chamber. Inoculations from aqueous, vitreous, and blood gave negative results. The next day there were œdema and swelling of the lids, with exophthalmos, cloudiness of the aqueous, discoloration of the iris, a contracted pupil which did not react to light, symptoms of a commencing panophthalmitis. Inoculations from the blood, the right vitreous, and the aqueous of both eyes gave negative, from the left vitreous positive, results. The next day the symptoms of the left eye were worse, with muco-purulent secretion from the lids. Inoculations from the right aqueous and vitreous were negative, from the left aqueous and vitreous positive. The microscopical examination of the left vitreous revealed many mono- and polynuclear leucocytes and four or five bacilli enclosed by leucocytes on each slide. The animal was killed seventy-two hours after the second injection. Negative results were obtained from inoculations made from the liver, spleen, kidneys, and blood of the heart. Microscopical examination of sections of the hardened eye showed abundant infiltration of cells in all the tunics of the eye, especially the retina, and a fibrino-purulent exudate in the aqueous and vitreous. Between the ciliary processes, and to a less degree in the ciliary vessels, were many bacilli, part of them free, part enclosed in mono- or polynuclear leucocytes and in destroyed pus cells. There was an innumerable number of bacilli in the tissue and vessels of the retina and choroid, almost all in the grasp of leucocytes.

Experiment E.—Rabbit, weight 2 kilo. Intravenous injection of 2*ccm* of a one-day's culture of bacillus pyocyaneus and cauterization of the lower half of the limbus corneæ. On the next day, inoculations from the aqueous and vitreous of both eyes and from the blood gave negative results. On the following day, there was found a diffuse cloudiness of the lower half of the left cornea, hyperæmia of the iris, and little fibrinous deposits in the anterior chamber. Inoculations from the blood and the left vitreous gave positive results, from the aqueous of both eyes and the right vitreous negative. A foreign body was then introduced into the posterior portion of the eye and another injection of 1.5*ccm* of a one-day's culture of bacillus pyocyaneus made. Ten to eleven hours later, inoculations from the blood and the right aqueous and vitreous gave negative results, from the left aqueous and vitreous positive. The next day, the general condition of the animal was good, the lids of the left eye were swollen, and the aqueous cloudy. Inoculations from the blood and right vitreous were negative, from the left vitreous and the aqueous of both eyes positive. The next day, there were œdema and great infiltration of the lids of the left eye, exophthalmos, muddy iris, contracted pupil, cloudy media, panophthalmitis. Inoculations, fifty hours after the second infection of the animal, from the blood and right vitreous negative, from left vitreous and the aqueous of both eyes positive. Microscopical examination of the left vitreous showed many bacilli free and enclosed in leucocytes. The animal was killed fifty-seven hours after the second injection. Inoculations from the liver, spleen, kidneys, and blood in the heart gave negative results. Microscopical examination of sections of the hardened eye showed a cellular infiltration of the tunics of the eye, a fibrinous exudate with pus cells in the anterior portion of the eye, a fibrino-purulent exudation in the vitreous and between the detached retina and choroid, many bacilli in the different parts of the ciliary body, chiefly about the vessels, and very many bacilli in the choroid and retina, sometimes even in the vessels. Most of the bacteria were enclosed in cells.

Experiment F.—Rabbit, weight 2 kilo. Introduction of a

foreign body into the posterior portion of the left eye. Two days later, intravenous injection of *2ccm* of a one-day's culture of bacillus pyocyaneus. Inoculations from the aqueous and vitreous of both eyes twenty-four, forty-eight, and seventy-two hours after the injection gave negative results. Three days after the first injection, the lower half of the left limbus corneæ was cauterized and a second injection made of *2ccm* of a one-day's culture of bacillus pyocyaneus. Inoculations from the blood and from the aqueous and vitreous of both eyes twenty-four and forty-eight hours later gave negative results. Four days after the second injection, *2ccm* of a three-days' culture of staphylococcus pyogenes aureus were injected. Three hours later, inoculations from the blood and the aqueous and vitreous of both eyes gave positive results, the staphylococcus being present in all. The animal died nineteen hours after the injection of the staphylococcus culture.

Two conditions in Experiments D and E, which produced similar results, deserve consideration. The bacteria appeared first in the vitreous and later in the aqueous, corresponding to the succession of injuries to the two parts of the eye. This may have been due to the gradually increasing influence of the two injuries, or it may have been that the bacteria which had entered the vitreous multiplied and passed by continuity into the anterior portion of the eye. The other condition was that the entrance of the bacteria coincided with severe clinical symptoms, in which respect these two cases differed from all the rest of the experiments. Many times single symptoms were present, such as distension of the blood-vessels, or little fibrinous deposits in the anterior chamber, but these could be attributed to the irritation, or to our manipulations of the eye, while here we had panophthalmitis, confirmed by microscopical examination. Although in these experiments the same manipulations were made, the inflammation must be attributed to the microbes which had entered the eye, because of the exclusive presence in the eye of the culture injected into the blood and the extensive phagocytosis. It should be noted also that in these two cases the retina was the part of the

eye most involved and contained the largest number of bacteria.

In Experiment F, the second injection of the pyocyaneus culture did not induce entrance of the bacteria into the eye, probably because it disappeared very quickly from the blood, but in three hours after the injection of the more virulent staphylococcus culture, which also remains more persistently in the blood, the cocci had entered the eye.

The fact that in Experiments D and E the bacteria entered the uninjured eye also may be explained either by the unavoidable injuries occasioned by the frequent removal of portions of the humors of the eye, or by the greater virulence of the culture used, but we are not in a position to agree with Moll that the irritation of one eye favors the entrance into the other of bacteria circulating in the blood.

From this group of experiments we draw the following conclusion:

With a weak or moderate general infection, the simultaneous or consecutive irritation of both portions of the eye favors the entrance of bacteria more than the irritation of either portion alone. With a certain virulence of the culture, the germs thus introduced can excite clinical inflammatory symptoms.

EXPERIMENTS WITHOUT IRRITATION OF THE EYE.

These were undertaken to determine whether a severe general infection is sufficient to cause the passage of bacteria circulating in the blood into an uninjured eye. The general infection was obtained in two cases by the injection of a large quantity of a culture of medium virulence, in one by repeated injections of a culture of medium virulence of bacillus pyocyaneus, followed by an injection of a very virulent culture of staphylococcus pyogenes aureus, and in three by the injection of *2ccm* of the latter culture. The first two and one of the last three gave negative results, though death occurred in from eighteen to twenty-five hours. Yet in two other cases in which the general infection was milder the bacteria were found in the aqueous of both eyes, which

proves that with a mild infection bacteria can enter the aqueous, though not the vitreous.

In the three remaining experiments in which the very virulent culture was used, the presence of the bacteria was demonstrated in both vitreous and aqueous after twenty-nine, fifty-six, and seventy-two hours respectively.

To forestall the objection that the repeated withdrawals of vitreous favored as an irritation the entrance of microbes into the eye, the inoculations were made only once in this group of experiments, ten to seventy-two hours after the injection of the culture, and the result of this inoculation was held to be final. This proves that the positive results obtained were caused by the influence of the injected culture alone.

From these experiments we learn that the severity of the general infection favors the passage of bacteria into the vitreous more than any kind of injury in connection with a mild infection, and that an infection of a small quantity of very virulent germs shows a greater influence in this respect than one of a large quantity of a weaker culture.

From a general view of these four groups of experiments we can establish these important facts:

1. Bacteria injected into the blood often disappear within a very short time, varying according to the culture used.

2. Microbes which have disappeared from the blood can reappear after a varying lapse of time, and thereby gain entrance into the eye.

As it is known that certain of the internal organs seize upon microbes circulating in the blood, such a reappearance of the bacteria may be explained by supposing that there are times when the internal organs can no longer hold all the injected and multiplied germs, and that the surplus bacteria are then thrown again into the general circulation. Hence insufficient activity of the internal organs, or their weakness from any cause, favors a prolonged stay of the bacteria in the blood, or it may be several reappearances, and consequently it favors endogenous infection of the eye.

3. The presence in the eye of a culture injected into the blood can be demonstrated even when it has disappeared from the circulation.

MICROSCOPICAL EXAMINATION OF THE HARDENED EYE-BALLS.

Thirteen eyes from which positive results had been obtained were cut into sections and examined. In two no microbes were found, in eleven the same bacteria were found which had produced the general infection. In the anterior portion of the eye they were mostly in different parts of the ciliary processes, especially in the neighborhood of the vessels, and sometimes in the vessels themselves. They were found only three times in the tissue of the iris, where they were enclosed in leucocytes. These had probably come from the anterior chamber. In the posterior portion the bacteria were found seven times in the tissue and vessels of the retina, five times in the tissue and vessels of the choroid, usually in both tunics at the same time. Only once were they found in the lymph space of the sheath of the optic nerve. In this case one could be assured of the direct passage of the bacteria from this space into the sclera and choroid, which apparently took place simultaneously with the endogenous infection of the eye from the blood stream, because the bacteria were present in various vessels of the eye. It is noteworthy that in all cases, except Experiments D and E, the walls of the vessels showed no changes in spite of the presence of bacteria within them and in spite of the passage of the bacteria into the neighboring tissues, and that no exudates or emboli could be seen within them.

A great part of the microbes found were enclosed in mono- and polynuclear leucocytes and in the endothelial cells. This extensive phagocytosis was no less marked in those cases in which during life almost no symptoms of irritation could be observed.

CONCLUSIONS.

1. It is possible experimentally to induce the entrance into the vitreous of bacteria circulating in the blood.

2. This entrance of bacteria into the vitreous is not from the anterior chamber, but from the blood-vessels of the posterior portion of the eye.

3. Bacteria circulating in the blood enter the aqueous

from the ciliary vessels, the vitreous from the retinal and choroidal vessels. The iris and the lymphatic spaces of the optic nerve apparently play no part in this respect, although the simultaneous diffusion of the microbes by continuity through the lymph space of the sheath of the optic nerve to the eye is frequently possible.

4. In spite of the absence of inflammatory symptoms, phagocytosis, directed toward their destruction, is always present when bacteria have entered an eye.

5. Under certain favorable circumstances, a severe inflammation of the eye can be obtained endogenously by experiment.

6. With a mild or moderately severe general infection, bacteria enter the vitreous only when the eye has been injured shortly before; an injury to both the anterior and posterior portions of the eye forms the most favorable condition for the entrance of bacteria, an injury to the posterior portion of the eye alone the next most favorable, and in a far less degree an injury to the anterior portion.

7. With a severe general infection, bacteria circulating in the blood may frequently pass into the vitreous of normal, non-irritated eyes.

How is the favorable influence of irritation, or of the great virulence of bacteria circulating in the blood, upon the power of penetration of the latter into the eye to be explained?

The influence of the irritation may be explained by the irritation of the sensory nerves, by the hyperæmia excited, or perhaps by both of these combined. The experiments of Roger, Buffer and Charrin, Hermann, Caspar, Nekam, Babinski and Meunier, Hofbauer and Czylarz with division of the renal, pneumogastric, and auriculo-temporal nerves, as well as those of Trambusti and Comba with excision of the inferior cœliac ganglion, seem to show that the destruction or exclusion of the normal function of a nerve particularly favors the entrance into the corresponding organ of bacteria circulating in the blood. Hofbauer and Czylarz, who experimented with the ischiadic nerve and made a series of control experiments with extirpation of the abdominal sympathetic and partial section of the spinal cord, concluded

that section of the ischiadic nerve favored the settlement of bacteria in the corresponding extremity, not in consequence of the paralysis of the motor or sensory nerve fibres, but as the result of the exclusion of the sympathetic and the resultant hyperæmia. No similar experiment has been made in regard to the eye, but some facts seem to indicate that the irritation of the eye facilitates the entrance of bacteria from the blood, not only through the hyperæmia induced, but also through a trophic disturbance of the walls of the vessels and a reduction of the power of resistance of their endothelial cells, due to the immediate influence of the irritated sensory nerves. It is a well-established fact that the vessels of the eye show a great sensitiveness to a slight irritation of the surface of the eye, and it is to be added that the permeability of the ocular vessels is different from normal in the presence of irritation. These changes in the walls are probably of a trophic sort, because in all experiments with appearance of fibrin in the aqueous after irritation of the eye, as well as in all with entrance of bacteria into the injured eye, with the exception of two in which the bacteria caused inflammation of the entire eye, no change was visible with the microscope. Such trophic changes must be supposed to have taken place when bacteria enter a non-irritated eye, produced apparently by the action of the bacteria or of their toxines.

From our experiments, in conjunction with those of earlier writers, these two important facts can be deduced:

1. In experimental endogenous infection of the eye, the vitreous is a more favorable soil for the propagation of bacteria which have gained entrance than the aqueous, but the entrance of the bacteria is effected with more difficulty into the vitreous than into the aqueous.

2. Bacteria circulating in the blood can enter the aqueous and the vitreous in the absence of all inflammatory, embolic, or thrombotic processes in the vessels of the eye; to permit their passage, their trophic action on the vessel walls is sufficient.

It still remains undetermined why the bacteria find more difficulty in entering the vitreous than the aqueous, and also

whether it is possible to excite inflammation in an uninjured eye by the entrance of bacteria without organic changes in the vessel walls. These and other questions must be left for solution to future investigations, but some interesting points may be gleaned from what has been done. No inflammation accompanied the entrance of the bacteria into the aqueous alone, but inflammation was produced by their entrance into both aqueous and vitreous, therefore it may be asked whether the severity of endogenous eye diseases in men, which differs greatly in the same general disease, may not probably be determined not only by the virulence of the bacteria, but also by the location of the primary place of infection, in the anterior or posterior part of the eye. This conjecture receives support from the fact determined by pathological investigations that in the severer forms of endogenous eye disease the focus almost always lay in the choroid and retina, while the milder forms of disease, which rarely can furnish material for such examinations, may be ascribed with probability to a primary infection of the anterior part of the eye, especially the escape of microbes from the ciliary vessels into the aqueous, whence they invade the iris and other tissues.

In all our experiments, as in those of others, when the bacteria entered the aqueous only, and in all but two of ours in which they entered the vitreous, no clinical signs of inflammation were produced. This apparently paradoxical result may be explained by the insignificance of their number in most cases, their quick expulsion in the lymph stream from the aqueous, and the energetic phagocytosis in both aqueous and vitreous, and as we saw that various irritations favor the entrance of bacteria into the eye we can draw this conclusion:

All local and general processes in the organism which weaken the tissues and the cells, *e.g.*, previous sickness; all local lesions which interfere with the lymph circulation of the eye; all external and internal irritations of the eye, as accidental traumas, operations, strain of the accommodation from errors of refraction; all physiological and pathological conditions which cause hyperæmia of the eye, such as pregnancy, diseases of the heart, liver, kidneys, etc.; everything

which weakens or destroys the functions of the nerves of the eye, especially of the trigeminus and cervical sympathetic,—all of these conditions can give rise to endogenous infection of the eye in the presence of a local focus of infection in the organism.

A complete exposition of predisposing causes is not only of theoretical, but of practical interest in the way of prophylaxis. The facts now known show the need of a thorough examination of the general condition of a patient before any operation is performed, and the great importance of rest in the slightest infectious disease.

In closing we do not claim that we have added much that is new to the knowledge of endogenous infection of the eye, but our experiments confirm and complete some well-known clinical facts, explain a portion of them, and indicate the direction for future investigation.

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THE VALUE OF OPHTHALMIC EXAMINATIONS IN THE DIFFERENTIAL DIAGNOSIS BETWEEN TYPHOID FEVER AND ACUTE MILIARY TUBERCULOSIS.[1]

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(*With two text-cuts.*)

MY attention was called to this case about November 3, 1902, by one of the junior assistants of the St. Louis City Hospital, who asked me to examine the patient's eyes for the presence of choroidal tubercles, hoping thus to be able to diagnosticate between typhoid fever and acute miliary tuberculosis. The history was as follows:

C. McH., æt. thirty-five, admitted October 24, 1902.

Habits.—Smokes in moderation. No drug habits. Chews a great deal. Drinks whiskey and beer in moderation. Regular in eating and sleeping hours. Excesses in venery.

Family history.—Father has not been seen by patient for twenty years. Mother died of dysentery. Three brothers and two half-brothers healthy. No history of cancer or nervous affection.

Personal history.—Never married. Is tobacco wrapper; light work, but indoors.

Previous diseases.—Chicken-pox, typhoid-pneumonia, malaria, gonorrhœa fourteen years ago. No history of lues. No injuries of any kind.

Present trouble.—Became sick about four weeks before coming to the hospital, but worked a part of the time. Rigors and chilly

[1] Read before the Medical Society of the St. Louis City Hospital Alumni.

sensations, general malaise; no headache, nosebleeding, or vomiting. Limbs and back ached. Anorexia. Face looks heavy, lips and tongue dry. Weighs about 110 lbs., but formerly weighed 135 lbs. Height, 5 ft. 6 in. Is not well nourished. Lips anæmic.

Digestive apparatus.—Tongue coated, but clean around the edges. Abdomen somewhat distended and tender on pressure. Ileo-cæcal gurgling. Inclined to constipation. Spleen and liver enlarged.

Respiratory apparatus.—Coughs and spits occasionally. No râles; breathing a little harsh, but otherwise normal. Respiration quickened.

Circulatory apparatus. — Pulse rapid, heart sounds normal. Sweats in early morning. No rose spots. Widal negative. No leucocytosis. Pulse full, but of low tension. No tâche cérébrale.

Urinary system.—Diazo negative; urine 1.005, pale yellow, acid, clear, no albumin, no sugar.

Nervous system.—Sleeps well, no subsultus, no carphologia, no tâche bleuatre, no pain.

Diagnosis.—Typhoid fever.

Prognosis.—Guarded.

Treatment.—Stimulants, baths.

The blood was examined four times for the Widal reaction, which was always negative. The urine was three times negative for the diazo. Plasmodia malariæ were not found. The sputum and the blood were examined for tubercle bacilli, but none was found. Towards the last, the lungs showed symptoms of involvement, viz., more frequent cough, pain in the lower part of the chest, a few dry râles, but no area of dulness. Patient grew gradually weaker, became somewhat delirious, and died November 21st.

The diagnosis lay, as it usually does, between typhoid fever and acute miliary tuberculosis, with the weight of opinion in favor of the former. The Widal and diazo reactions were negative, the course of the temperature atypical, and the rose spots were not seen. On the other hand, there was no history of tuberculosis, the lungs gave no evidence of involvement until the last few days, and then only such as might be caused by the typhoidal process. Tubercle bacilli were at no time found in the sputum, blood, or fæces.

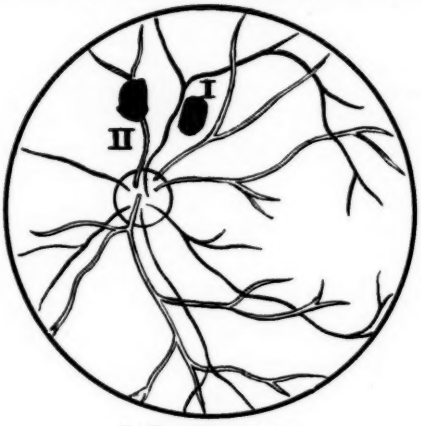
It is unfortunate that just at this juncture, when the eye symp-

toms would have proved a valuable aid in the diagnosis, the oculists who saw the case disagreed as to the condition present in the eyes. The physicians in charge can not be blamed for adhering to their diagnosis of typhoid fever, when of the five oculists who saw the case, three said that the fundi were absolutely normal, one diagnosticated "infiltrations of the choroid" without a positive statement as to their nature, while only one made and maintained the diagnosis of miliary tuberculosis of the choroid.

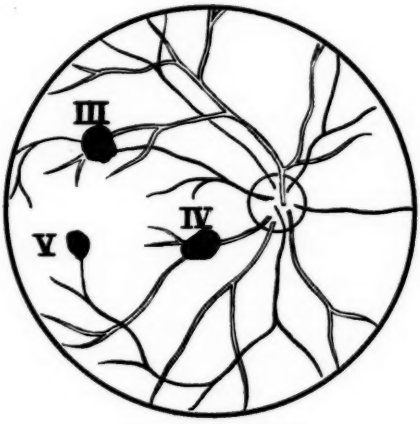
The examination of the eyes revealed the following conditions: Pupils dilated, reacting somewhat sluggishly to light. Patient made no complaint of disturbance of vision, which is of common occurrence in at least the earlier stages of choroidal affections. No test cards were at hand to make tests for visual acuteness, but patient, up to the evening before his death, certainly possessed a considerable amount of vision. Patient was so weak that it was necessary to examine him in a recumbent position. The source of light was an ordinary incandescent lamp, and the room could not be darkened sufficiently. These factors rendered the examination very difficult and no doubt determined the difference in the ophthalmic pictures as seen by the consulting oculists. In the right eye, I was unable to make out any pathologic changes. The left, however, showed in the lower and middle portion of the inverted image, consequently in the upper and middle portion of the fundus, a small yellowish-white patch, lying immediately adjacent to one of the superior vessels. The limitations of the patch were fairly sharply defined from the surrounding fundus by its color, but there was no pigment ring. I was unable to determine whether the patch lay in the same plane as the choroid or projected forwards.

I again examined the patient on November 7th. This time in the left eye there were two patches, in the same region, separated from each other by about *2mm*, and plainly projecting above the niveau of the fundus. I have numbered these patches I and II respectively on the drawings. Number II lay so close to Number I that I should have seen it if it had been present at the first examination. I conclude that it had developed in the interval between the two examinations; probably a submiliary tubercle had grown enough to become ophthalmoscopically visible. A thorough examination of the fundus, so far as it was possible without the use of a mydriatic, revealed nothing further. In the right eye, however, there was now to be seen a focus corresponding to the

others in all particulars except in point of size and position. It was smaller than they, and lay more towards the macula. It is represented on the drawings by Number III. A fortunate circumstance was its position beneath one of the temporal retinal vessels, which could plainly be seen running over and raised by it.



L. E. Erect Image.



R. E. Erect Image.

My next examination was two days later. Some one, in the meantime, had dilated the pupil of the right eye with atropine.

The left eye showed an increase in the size of the tubercles but not in the number. In the right eye, however, were two new ones, numbered IV and V respectively. Both lay below the macula in the direct picture, consequently above in the indirect, V lying more peripherally than IV. Their positions correspond fairly well to the course of one of the inferior temporal vessels.

Repeated examinations, continued up to the day before his death, showed no change in the number of the tubercles, but a gradual increase in their size was noticed. Towards the last, the patient became more difficult to examine, owing to the supervention of a semi-comatose condition. Patient died Nov. 21st, three weeks after he came under my observation.

The **post-mortem** revealed a general miliary tuberculosis. Only the posterior segments of the eyes were removed. In the right eye were three yellowish-white nodules, lying subretinally and evidently arising from the choroid. Their positions were the same as I had made out ophthalmoscopically. Only three were macroscopically visible. The left eye contained only two tubercles, each about the size of the optic disc, and lying in the positions I had determined *intra vitam.* I had hoped to be able to demonstrate one fundus macroscopically and one microscopically, but the right eye was secured by some one else, and I was compelled to limit my investigations to the left. I am therefore able to demonstrate only one of the tubercles in the left eye; the other has been removed for microscopical examination. It will be seen that the remaining one corresponds to the description which I have already given.

The microscopical examination of the tubercle removed showed it to be a fusiform enlargement with the long diameter from above downwards, lying wholly within the choroid. The retina was detached from the choroid and the latter from the sclera during the process of removal and hardening. The pigment layer of the retina still adheres to the choroid except over the tubercle itself, where it fails entirely. Portions of the choroid are adherent to the sclera. This is especially true of the area beneath the tubercle, where there has been a migration of the choroidal pigment into the sclera, accompanied by a slight degree of small-cell infiltration. A scleral blood-vessel is seen in cross-section, and the surrounding tissue shows a small-cell infiltration. Otherwise the sclera is normal.

The choroid is in places infiltrated with round cells, the blood-

vessels are full, and the pigment cells seem increased in number and massed together. As they approach the tubercle, the infiltration and the distension of the blood-vessels become more prominent, and the pigment cells become divided into two layers. One of these passes posteriorly to the tubercle, the other anteriorly. Where the section passes through the centre of the tubercle, the posterior layer is interrupted for a short distance, just at the posterior pole of the tubercle, to reappear a little farther on. In the other sections, it is seen as one continuous layer. Anteriorly, the layer consists of a few scattered cells which can be followed only for a short distance either above or below.

The microscopical picture suggests the impression that the tubercle started in the middle layers of the choroid and growing in all directions, pressed aside the pigment cells into two layers. Owing to the more rapid growth of the central portion, especially anteriorly, a pressure atrophy of the pigment cells ensued. Remains of these may be seen in the form of small deposits of pigment scattered here and there through the tubercle.

As to the tubercle itself, the picture varies with the location of the section. Where this passes through the middle of the tubercle in its long diameter, the centre is seen to be occupied by a blood-vessel with thick walls, cut in the longitudinal direction. In this are numerous leucocytes, while around it is an incomplete sheath consisting of a few cells with large nuclei, a large number of leucocytes, and a matrix of poorly staining, homogeneous substance, in which lies the detritus of broken-down cells, nuclei, and pigment granules. Here and there, fibres of interstitial tissue can be recognized by their staining with acid fuchsin. No giant cells are to be found, which is all the more to be deplored, as this is one of the few places in the body where giant cells containing pigment granules have been seen. Peripherally, especially above and below, the so-called epithelioid cells appear in large numbers. Here they lie in wedge-shaped areas, whose apices are directed towards, and lie in the angle formed by, the diverging layers of pigment cells mentioned above. They resemble an advance guard preparing the way for other pathologic conditions.

As the sections approach the periphery of the tubercle, the picture changes somewhat. The blood-vessel disappears or appears only in cross-section. The caseous degeneration persists to the periphery of the tubercle, in lessening amount. The interstitial tissue increases and arranges itself so as to form small

subdivisions of the tubercle, each with its central area of caseous degeneration, and its more peripherally lying round and epithelioid cells. As to the other characteristic feature of a miliary tubercle, viz., the giant cell, I cannot say that I saw a distinctly typical one in any of the sections examined, and I should prefer to say they were absent, rather than assign to accidental forms a value they do not possess.

If the diagnosis were in doubt, however, it would be fully settled by the *bacteriologic findings*. I have been able to demonstrate clearly the presence of the tubercle bacilli in the tumor mass. The method of staining was very simple. I placed the sections for twenty-four hours in the Ziehl-Nielsen carbol-fuchsin solution, washed out the excess of the stain, let them lie for twenty-four hours in distilled water to dissolve out all possible excess of the stain, decolorized carefully in a moderately strong solution of nitric acid, and finally counterstained with a saturated aqueous solution of methylene blue. The bacilli lie especially in those portions of the tubercle which are undergoing caseous degeneration.

Tubercles of the choroid have been known for nearly one hundred years. Autenrieth, in 1808, reported the finding of choroidal tubercles in the eyes of a cadaver. He described them as "isolated, white pustules of size of an ordinary pin's head, which are similar to those found *post mortem* on the peritoneum of patients dying of consumption. Jaeger, in 1855, reported that he had seen choroidal tubercles *intra vitam*, by means of the ophthalmoscope, but his report attracted little attention. The credit of presenting the subject anew, and of calling the attention of the scientific medical world to the value of tubercles of the choroid in diagnosticating between miliary tuberculosis and typhoid fever, belongs to MANZ. Since the publication of his papers, the literature relating to tuberculosis of the choroid has become very voluminous. I subjoin a list of the articles on the subject. Where I could obtain the original article, I made a brief abstract of it. The number of American papers on this subject is very small, less than half a dozen.

The classical tubercles of the choroid lie in the region surrounding the optic disc and the macula lutea. They are

roundish and varying in size, ranging from 0.3*mm* to 2.5*mm* in diameter. To be ophthalmoscopically visible, they must possess a diameter of more than 0.6*mm*. They arise from the tissue of the choroid. Within this they reach a certain size, then grow outwards towards the retina, pushing apart the cells of the pigment epithelium. This causes a focus of whitish discoloration on the fundus, directly proportionate to the size of the tubercle. (Becker reported a case where the tubercle, although of 1*mm* diameter, was completely covered by the pigment layer of the retina, and was invisible until this was removed.) There is a gradual transition from the whitish centre of the tubercle to the normal red of the fundus, and a pigment ring is very rarely seen. That the tubercle really projects above the niveau of the fundus is demonstrable by means of the parallactic movements, especially if it lies immediately under or in close proximity to a retinal vessel. There are usually no changes in the refractive media, and no hemorrhages. The tubercles may appear at any stage of the disease, and sometimes grow so rapidly as to become ophthalmoscopically visible overnight.

In regard to the etiology of the process, tuberculosis of the choroid can arise from two different causes: ectogenous, when the infection is conveyed into the eye from without, *e.g.*, by a trauma; or endogenous, when the bacteria are carried to the eye from some other part of the body. The ocular tuberculosis may be a part of a general miliary tuberculosis, or it may be the only focus demonstrable in the body. It may caseate and break into a blood- or lymph-vessel, and so be the origin of a general miliary tuberculosis.

Opinions differ as to the frequency with which tuberculosis of the choroid is a part of a general miliary tuberculosis. Cohnheim found it in almost every case. I was unable to obtain the exact percentage. On the other hand, Dahl found it absent in all of three cases. Between these two extremes are the findings of the following authors: Bouchert, 10%; Bock 82.7%; Demme, 21%; Litten, 75%; Carpenter and Stephenson, 50%, also in 9.25% of tuberculous affections other than general miliary tuberculosis. From such wide diversity of findings, no fixed conclusions as to

the frequency of the occurrence can be drawn, but at least we may expect to find tuberculosis of the choroid in at least 50% of the cases of general miliary tuberculosis. Its absence does not disprove the presence of the general process. Its presence, especially when its development can be followed, coupled with other less characteristic symptoms, is pathognomonic of a general miliary tuberculosis. In cases of supposed typhoid fever running an atypical course, especially where the Widal is negative, the eye should be examined. The presence of tubercles may not affect the therapeusis of the case, but there are certainly cases in which a correct diagnosis is imperative from a forensic standpoint as well as being scientifically satisfactory. Apropos to the discussion, there are usually submiliary tubercles present in addition to those ophthalmoscopically visible. These may at any time grow so rapidly that they may be seen *intra vitam.* A second or even a third examination may demonstrate their presence.

In conclusion, I wish to thank the members of the hospital corps for the courtesy through which I was enabled to make a study of the case, and also Dr. Barck, who placed his library at my disposal and made the collection of the following literature possible.

Name.	Publication.	Diagnosis.	Macroscopic Appearances.	Microscopic Appearances.
Alexander.....	*Centralbl. f. prakt. Augenheilk.*, 1884.			
Auger	*Gaz. méd. de Paris*, 1878, 622.			
Autenrieth....	*Versuch. f. d. prakt. Heilk. aus d. klinische Anstalten von Tübingen*, 1808.		White pustules of size of pin's head in choroid.	
Ammon.....	*Holcker's lit. Annalen*, Bd. xv.			
Bach	*Arch. f. Augenh.*, Bd. xxviii., 536, 1893. (English Edition.)	Tub. of eye.	Tuber. of iris, ciliary body, choroid, retina, sclera.	Epithelial cells, giant cells, leucocytes.
"	*Münch. med. Wochenschr.*, 1895, No. 18.			
Bauhut	*Comptes rendues du congrès méd. de Paris*, 1867, 455.			
Bargartz	*Nagel's Jahresb.*, 1891, 162.			
Barlow	*Lancet*, Nov., 1883, 925.			
Baumgarten...	*Arch. f. Ophth.*, xxiv., 3, 185.			
Becker, v.....	*Notisblad för Läkare och farmaceuten*, 1868, Helsingfors.			
Beraidinis.....	*Nagel's Jahresb.*, 1898, 324.			
Bongartz	*Ueber d. Ausbreitung d. tuberculösen Infection im Auge.* Würzburg, 1891.			
Bock	*Virchow's Archiv*, Bd. xci.			
Bouchert.....	*Nagel's Jahresb.*, 1884, 352.			
"	*Atlas d'opht. médic.*, p. 63.			
"	*Gaz. des hôpitaux*, 1868, Dec. 31.	Tuberculosis of choroid.	Miliary tuber. of choroid, neuritis.	
"	*Gaz. des hôpitaux*, 1869, No. 1.	Tuberculosis of choroid.	Miliary tuber. of choroid, neuritis.	
"	*Gaz. des hôpitaux*, 1870, pp. 245–250.			
"	*Gaz. des hôpitaux*, 1871, Nos. 25, 26.	Tuberculosis of choroid.	Miliary tuber. of choroid, neuritis.	
"	*Gaz. des hôpitaux*, 1875, 338.	Tuberculosis of choroid.	Miliary tuber. of choroid, neuritis.	
"	*Union méd.*, Oct. 16, 1869.	Tuberculosis of choroid.	Miliary tuber. of choroid, neuritis.	
Brailey.....	*Trans. Ophth. Society United Kingdom*, 1884, vol. iii., 129.			
Barraquer.....	*Rec. d'opht.*, Aug., 1882, 475.			

Name.	Publication.	Diagnosis.	Macroscopic Appearances.	Microscopic Appearances.
Brückner	*Arch. f. Ophth.*, xxxvi., 3, 154.	Tuber. of choroid. Optic neuritis.	Miliary tuberculosis of choroid, neuritis.	Round cells, giant cells, epithelioid cells, caseous degeneration.
Burnett, S. M.	*Archives of Ophthalmology.*	Intraocular tumor.	Tumor of choroid, extending from optic nerve to ora serrata.	Round cells, giant cells, caseous degeneration.
Busch.....	*Virchow's Archiv*, Bd. xxxvi.			
Carpenter.....	*Brit. Med. Jour.*, 1891, 66.			
"	*Lancet*, 1901, ii., 134.			
Castenholz	*Nagel's Jahresb.*, 1884, 254.			
Charpentier....	*Nagel's Jahresb.*, 1895, 361.			
Chevallereau ..	*Nagel's Jahresb.*, 1897, 472.			
Cohnheim	*Virchow's Arch.*, Bd. xxxix.			
Corrozi.....	*Galezowsky, archiv. génér. de méd.*, 1867.			
Coupland.....	*Trans. of Path. Society of London*, 1874, 215.			
Davidsohn	*Nagel's Jahresb.*, 1888, 370.			
Demme	*Twenty-fifth Med. Report on the Jenner's Children's Hospital at Berne*, 1888.			
Denig.....	*Arch. f. Augenh.*, xxxi., 359.			
Denti.....	*Nagel's Jahresb.*, 1894, 383.			
Deutschmann..	*Nagel's Jahresb.*, 1891, 162.			
"	*Arch. f. Ophth.*, xxvi., 2, 99.	Miliary tuberculosis of choroid, experimentally produced.	Tuberclosis of choroid, vitreous, and retina.	Round, epithelioid, and giant cells.
"	*Arch. f. Ophth.*, xxvii., 1, 224.	Mil. tuber. of choroid following tuber. meningitis experimentally produced.	Mil. tuber. of sheath of optic nerve, vitreous, and choroid.	Round and epithelioid cells, no typical giant cells.
Daulonoy.....	*Nagel's Jahresb.*, 1900, 566.			
Dinkler	*Arch. f. Ophth.*, xxxv., 4, 313.	Ileo-typhus, miliary tuberculosis.	Unpigmented, spindle-shaped swelling, especially in temporal part, nerve and retina not involved.	Changes in pigment epithelium. Free pigment. Submiliary and miliary tubercles. Diffuse infiltrations. Pigmented giant cells.

Name.	Publication.	Diagnosis.	Macroscopic Appearances.	Microscopic Appearances.
Dubrisoy.....	*Gaz. des hôpitaux*, 1875, 850.			
Duci	*Nagel's Jahresb.*, 1888, 371.			
Edrington.....	*Lancet*, Feb., 1899.	Choroiditis purulentia tuberculosa?	Detachment of retina, due to large mass between retina and choroid.	Round-cell exudation in mass, typical tuberc. structure.
Eperon	*Arch. d'opht.*, iii., 485, 1884.			
Falchi.....	*Annal. di Ottalm.*, xi., 132.			
Fränkel, B....	*Berlin. klin. Wochen.*, 1872, 4–6.	Tuber. of choroid.	L. E., one large spot. R. E., small spots.	
"	*Jahresbuch f. Kinderheilk.*, Neue Folge, ii. Bd., 113.			
Fromaget	*La clinique opht.*, 1902.			
Garlick	*Medico-chirurg. Trans.*, vol. lxii, 441, 1879.			
Gerlach.....	*Anat. Bericht über d. Versamml. d. Gesellsch. deutsch. Naturforscher und Aertze in Wiesbaden*, Sept., 1852.	Miliary tuberculosis of choroid.		
Graefe, A. v...	*Arch. f. Ophth.*, ii., 120.	Accidental finding in pig's eyes.	Prominence in sclera filled with white tumor; numerous small nodules.	Caseous degen. of tumor, nodules in structure similar to tuber. of lungs.
"	*Arch. f. Ophth.*, xiv., 1, 183.	Tuberculosis of choroid; both eyes.	Numerous miliary and submiliary tubercles.	
Gruening	*N. Y. Eye and Ear Infirmary Reports*, Jan., 1901.			
Grosz.....	*Nagel's Jahresb.*, 1900, 566.			
Gutman.....	*Arch. f. Augenheilk.*, xxxi., 158.			
Haab	*Nagel's Jahresb.*, 1891, 145.			
"	*Klin. Monatsbl. f. Augenheilk.*, xxii., 391, 1884.	Intraocular tumor.	Large tumor, central caseation.	Round cells, giant cells, tubercle bacilli.
"	*Arch. f. Ophth.*, xxv., 4, 221.	General discussion of subject.		
Haight.....		Tuberculosis of the Eye.		
Hartley	*Ophth. Review*, 1887, 86.			
Heinzel	*Jahresb. f. Kinderheilk.*, Neue Folge, viii., 3, 331.			
Hirschberg ...	*Centralbl. f. prakt. Augenheilk.*, 2, 1877.			

Name.	Publication.	Diagnosis.	Macroscopic Appearances.	Microscopic Appearances.
Hirschberg ...	*Nagel's Jahresb.*, 1887.			
"	*Transact. of Internat. Medical Congress, London*, 1881, 117.			
Hock	*Nagel's Jahresb.*, 1883, 423.			
Horner	*Nagel's Jahresb.*, 1882, 391.			
Hosch.....	*Archiv. d'opht.*, ii., 6.			
"	*Correspbl. f. Schweiz. Aertze*, March, 1883.			
"	*Correspbl. f. Schweiz. Aertze*, March, 1885, xv., 153.			
Jäger, v.....	*Plenear Versamml. d. Wiener Doctor. Colleg.*, 10, i., 1885.	Tubercles of choroid.	Whitish yellow to lemon yellow, round, oval, or irregular bodies, size of lens.	Large number of nuclei, few cells, and degenerative foci.
"	Ophth. Handbuch.			
"	Beiträgen zur Path. des Auges.	Tubercles of choroid?	Many round bright yellow spots of varying size, no pigment, margins not sharply defined.	
Jessop.....	*Lancet*, ii., 689, 1884.			
"	*Brit. Med. Journal*, Aug., 1901.			
Jung	*Arch. f. Ophth.*, xxxvii., 4, 125.	Sequelæ of tuberculous irido-choroiditis or tumor.	Conglomerate tubercle, involvement of optic nerve.	Pigmented giant cells, thickening of choroid, tuberculous infiltration, tubercle bacilli.
Kabsch.....	*Nagel's Jahresb.*, 1891, 188.			
Koch.....	*Etiologie d. Tuberculosis.*			
Koehler	*Nagel's Jahresb.*, 1884, 254.			
Krämer	*Nagel's Jahresb.*, 1895, 522.			
Kunz.....	*Klin. Monatsbl. f. Augenheilk.*, 1901.			
Lawford.....	*Ophth. Review*, 1885, 248, 343.			
Leber	*Arch. f. Ophthal.*, xiv., i., 183.			
"	*Sitzungber. d. ophth. Gesellsch. in Heidelberg*, 1891, 44.			
Leidholdt.....	*Nagel's Jahresb.*, 1889, 500.			
Liebrecht.....	*Arch. f. Ophth.*, xxxvi., 4, 224.	Large-cell sarcoma.	Large intraocular tumor, detachment of retina.	Composed of many small tumors, epithelioid cells, caseous degeneration, giant cells, tubercle bacilli.

Name.	Publication.	Diagnosis.	Macroscopic Appearances.	Microscopic Appearances.
Liebrecht.....	*Münch. med. Wochenschr.*, 1897, 22.			
Lionville	*Bull. de la soc. anat. de Paris*, 1873, 19, 300.			
Litten.....	*Nagel's Jahresb.*, 1878.			
McHardy.....	*Trans. Ophth. Society United Kingdom*, 1888, viii., 179.			
Manfredi	*Annal. di Ottal.*, iv., 265, 291.	Intraocular abscess.	Miliary tubercles in stage of degen. in choroid, retina, optic nerve.	Caseous degeneration, giant cells.
"	*Annal. di Ottal.*, iii., 439.			
"	*Archiv. d'opht.*, i., 44.			
Mackenzie....	*Trans. Ophth. Soc. United Kingdom*, 1884, iii., 119.			
"	*Medical Times and Gazette*, ii., 512.			
Manz.....	*Zehender's klin. Monatsbl. f. Augenh.*, xix., 26.			
"	*Arch. f. Ophth.*, iv., 2, 120.	Miliary tuberculosis, typhoid fever.	Three tubercles L. E. One tubercle R. E.	Caseous degen., mono- and multinuclear cells, cells of different sizes and shapes.
"	*Arch. f. Ophth.*, ix., 3, 133.	None, intra vitam.	Several tubercles.	Cells of different sizes and shapes, detritus in centre, submiliary tubercles.
"	*Nagel's Jahresb.*, i.			
Maren.....	*Nagel's Jahresb.*, 1884, 325.			
Margulliesco...	*Nagel's Jahresb.*, 1898, 741.			
Mendel.....	*Berlin. Ophth. Gesell.*, May, 1901.			
Michel.....	*Klin. Monatsbl. f. Augenh.*, 1873, 263.			
"	*Deutscher Archiv f. klin. Medicin*, Bd. xxii., 439, 1878.			
Millingen.....	*Gaz. méd. d'orient*, xxxiii., 11.			
Money.....	*Lancet*, ii., 813, 1883.			
Morton.....	*Brit. Med. Journal*, 1891, 169.			
"	*Brit. Med. Journal*, 1892, i., 1190.			
Muhlert.....	*Nagel's Jahresb.*, 1885, 186.			
Mules.....	*Ophth. Review*, 1885, iv., 1.			
"	*Report Ophth. Soc. Great Britain*, 159.			

Name.	Publication.	Diagnosis.	Macroscopic Appearances.	Microscopic Appearances.
Mules.....	*Brit. Med. Journal*, 1884, ii., 1043.			
"	*Nagel's Jahresb.*, 1884, 325.			
Neese.....	*Arch. f. Augenh.*, xvi.			
"	*Arch. f. Augenh.*, xxxii.			
Neskowic.....	*Nagel's Jahresb.*, 1883, 306.			
Nettleship	*Nagel's Jahresb.*, ii., 221.			
"	*Ophth. Hospital Reports*, vii., 221.			
Ostenholz.....	*Inaug. Dissertation*, München, 1884.			
Pagenstecher, H.....	*Atlas der path. Anatomie.*			
Pasquier.....	*Journal d'opht.*, i., 560.			
Poncet.....	*Recueil d'opht.*, 1875, 189.			
Ponfik	*Nagel's Jahresb.*, iii., 317.		Choroidal tubercle 5 *mm.* in diameter.	
Pröbsting.....	*Klin. Monatsbl. f. Augenh.*, 1891, 321.			
"	*Berlin. klin. Wochenschr.*, 1884, 37.			
Raab.....	*Arch. f. Ophth.*, xxiv., 3, 164.			
Rambolotti....	*Nagel's Jahresb.*, 1894, 383.			
Reissmann....	*Arch. f. Ophth.*, xxx., 3, 251.	Choroiditis, pur. tuberculosa?	Perforation of ball, multiple miliary tubercles.	Round, epithelioid, and giant cells; caseous degeneration.
Remy	*Nagel's Jahresb.*, 1883, 423.			
Roberts	*Nagel's Jahresb.*, 1893, 322.			
Salamon.....	*Tagebl. der 49. Naturforscher Versamml.*, 8, 1876.			
Saltino	*Archiv. di Ottal.*, i., 383, 1894.			
Sattler	*Klin. Monatsbl.*, 1877, 68, 71.			
"	*X. Versamml. d. Ophth. Gesell. in Heidelberg.*	Irido-choroido-retinitis tuberculosa.		
"	*Arch. f. Ophth.*, xxiv., 3, 151.	Orbital tumor.	Choked disc, tubercles of retina in circumpapillary area.	Hypertrophy of supporting fibres of retina. Epithelioid, giant, and round cells, No degen. Tuberculosis of optic nerve.

Name.	Publication.	Diagnosis.	Macroscopic Appearances.	Microscopic Appearances.
Schaefer.....	*Klin. Monatsbl. f. Augenh.*, xxii., 1884, 30.	Intraocular abscess and granulations.	Large tumor mass arising from choroid.	Pigment epithelium covering intraocular portion of tumor. Giant, epithelioid, and round cells.
Schmidt	*Klin. Monatsbl. f. Augenh.*, 1873, 43.			
Schöbl	*Central. f. Augenh.*, xii., 231, 1888.			
Schroeder.....	*Arch. f. Ophth.*, xxxv., 3, 97.	Intraocular syphilitic tumor. Tuberculosis of choroid.	Intraocular tumor. Detachment of retina.	Round, epithelioid, and giant cells, detritus. Residuum of cysticercus.
Seccato.....	*Giornali d. R. Acad. di Med. Torino*, 1888, vol. l.			
Sgrosso.....	*Annal. di Ottal.*, 1901.			
Shears.....	*Nagel's Jahresb.*, 1888, 372.			
Sieffert.....	*Jour. d'opht.*, i., 526, 560.			
"	*Nagel's Jahresb.*, 1872, 362.	Neuritis optica.	Neuritis optica. Tuberculosis of choroid.	
Snellen.....	*Med. Tydschrift voor Genesk.*, 11, 1892.			
Soelberg-Wells	*Annal. d'oculist.*, 1867.			
Steffan.....	*Nagel's Jahresb.*, 1874, 27.			
Steffens	*Jahresb. f. Kinderh.*, ii., 315.			
"	*Jahresb. f. Kinderh.*, iii., 323.			
Stephenson ...	*Brit. Med. Journal*, Aug., 1901.			
"	*Lancet*, 1901, ii., 134.			
Stricker.....	*Charite-Annalen*, 1876, 329.			
Stoiesco.....	*Bull. de la soc. anat.*, 1874, 747.			
Tailor.....	*Annal. di Ottal.*, xviii., 1, 76.			
"	*Annal. di Ottal.*, xx., 309.			
Toupert.....	*Gaz. méd. de Paris*, 1884, 25.			
Troche.....	*Nagel's Jahresb.*, 1875, 263.			
Tuyl.....	*Klin. Monatsbl. f. Augenh.*, Nov., 1900.			
Ulrich	*Centralbl. f. prakt. Augenh.*			
Valude	*Bericht des Ophth. Gesell. in Heidelberg*, 1891, 66.			

Name.	Publication.	Diagnosis.	Macroscopic Appearances.	Microscopic Appearances.
Valude	*Arch. d'opht.*, xi., 3, 1891.			
Vernon	*Berlin klin. Wochenschr.*, 1868.			
Wagenmann...	*Arch. f. Ophth.*, xxxiv., 4, 158.	Cataract, sarcoma of choroid.	Detachment of retina. Tumor arising from choroid.	Round-cell infiltration of choroid, caseous degeneration. Typical miliary tubercles. Tubercle bacilli.
"	*Arch. f. Ophth.*, xxxiv., 4, 172.	Choroiditis exudativa.	Thickening of choroid, detachment of retina.	Round-cell infiltration of choroid, caseous degeneration. Typical miliary tubercles. Tubercle bacilli. Also hypertrophy of connective tissue in choroid.
"	*Bericht d. Ophth. Gesell. in Heidelberg*, 1891, 60.			
Warner.....	*Trans. Ophth. Society, United Kingdom*, 1884, iii., 129.			
"	*Med. Times and Gazette*, ii., 512.			
Weiss	*Arch. f. Ophth.*, xxxiii., 4, 57.	Conglomerate tubercle.	Large tubercle, composed of and surrounded by many miliary ones.	Giant, round, and epithelioid cells, caseous degeneration.
"	*Arch. f. Ophth.*, xxxiii., 4, 57.	Tubercle of choroid.	Five tubercles in macular region.	Giant, round, and epithelioid cells, caseous degeneration.
"	*Arch. f. Ophth.*, xxxiii., 4, 57.	Granuloma of iris.	Papillary tumor.	Giant, round, and epithelioid cells, caseous degeneration; also nests of cells binding together choroid and retina.
"	*Bericht d. Ophth. Gesell. in Heidelberg*, 1877, 121.			
Weissenfels...	*Nagel's Jahresb.*, 1882, 300.			

BUPHTHALMOS IN A SUBJECT OF CONGENITAL DISLOCATION OF THE CRYSTALLINE LENS.

By Dr. F. W. MARLOW, Syracuse, N. Y.

F. B., aged twenty-two years, was seen first on July 4, 1900. He gave a history of defective vision, enlargement of the right eye from birth, and near-sightedness of the left eye. Inspection showed enormous enlargement of the right eye, haziness of the cornea, thinning and bulging of the sclera above, making a dark projection immediately above and practically continuous with the cornea, of which it seems to be an extension upwards. Although the eye has been enlarged from birth, the scleral staphyloma has probably come on during the last four years. V equals P. L. +T(?). Patient can close the lids over the eye. Examination of the left eye showed a partial dislocation of the lens: V = $\frac{6}{6}$ −; with + 6 D, + 1.5 c., 80° = $\frac{6}{4}$ +. On Oct. 8, 1900, the eye was enucleated under ether at the Hospital of the Good Shepherd and put into formalin for detailed examination at a later date with special reference to the relation of the lens to the other structures. Unfortunately, in the confusion incident to the rebuilding and reorganizing of the hospital, the specimen was mislaid and has not been recovered. It can scarcely be doubted, however, that in this case we have an example of buphthalmos, or infantile glaucoma, of which the main etiological factor was a congenital dislocation of the lens.

This patient's family history is of much interest, and I will record it in as correct detail as I was able to obtain it at the time. Five other members of this family, the subjects of congenital dislocation of the lens, have come under my personal observation:

No. 1. Mrs. G. W., aged twenty-one, seen in September, 1895. V always defective; has to have the room dark and hold a paper near in order to see to read. Was examined by a local oculist some years ago, who said that it was impossible to fit her with

glasses. Has daily occipital headache; bright light nauseates her. R eye: V with + 14 D = $\frac{6}{18}$ −; iris tremulous; lens dislocated directly upward; fundus normal. L eye: V with + 14 D, + 1 D c., 140° = $\frac{6}{18}$; iris tremulous; lens dislocated inward and upward.

No. 2. Father of No. 1, æt. between fifty-five and sixty. I was called to see him at his house during the year 1896 on account of an impairment of sight. I found both lenses opaque and freely floating in an apparently fluid vitreous, one eye being in a state of acute glaucoma. Paracentesis and eserine relieved the acute symptoms. This patient gave a history of imperfect vision from childhood.

No. 3. F. B., female, æt. twenty-four, seen on June 27, 1900, cousin of No. 1. R iris normal, lens apparently normal; L iris tremulous at lower part, lens displaced up and in. After the pupils were dilated with scopolamine, the right iris was distinctly tremulous at the lower part of the pupil, which has a dark curved rim at the lower part, which is absent at the upper; fundus normal. R V = $\frac{6}{6}$ −; with − 1 D c., 100° = $\frac{6}{6}$ −. Left eye: V = $\frac{6}{24}$; with − 0.75 D, − 1.50 D c., 100° = $\frac{6}{18}$.

No. 4. The case of buphthalmos already described.

No. 5. B. B., male, æt. twenty-seven, seen in October, 1900. Vision always defective; has never worn glasses; iris tremulous below, bulged forward in the upward and inward quadrant. The lenses are dislocated upward and inward, leaving $\frac{1}{3}$ of the pupil unoccupied. R V with + 10 D = $\frac{6}{24}$. L V: with + 11 D = $\frac{6}{24}$.

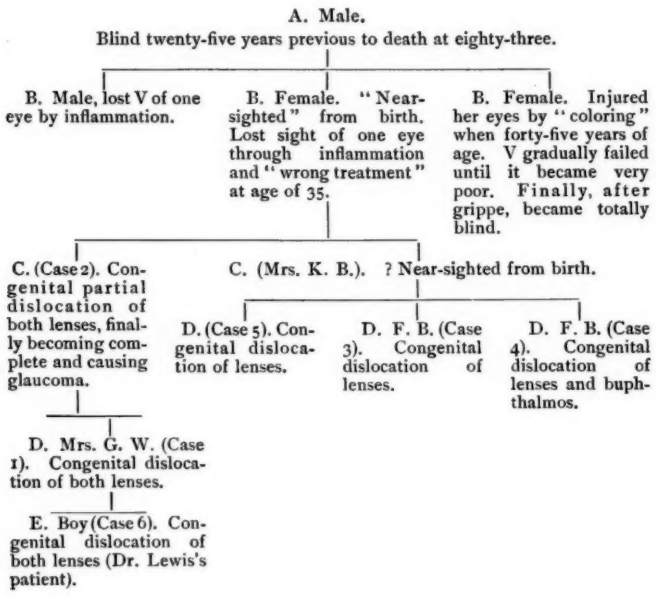
No. 6. The son of No. 1, seen by the courtesy of Dr. G. G. Lewis, who brought him to my office as a specimen of congenital dislocation of the lens.

It is of interest to note that in the majority of the cases mentioned the portion of the pupil unoccupied by the lens was utilized in the act of vision, No. 3 being the only patient in whom the lens was utilized. It is also of interest in this case to note that the edge of the dislocated lens could be seen in one eye only, although dislocation in low degree was doubtless present in the other eye also, as indicated by the tremulousness of the iris and the dark rim in the lower part of the pupil.

I append below a family tree in so far as I have been able to obtain it. This contains five generations, in every one of which blindness of one or both eyes of at least one

individual has been known to occur. In the last three generations the defective sight has been proven to be due to congenital dislocation of the lens, in two cases complicated by glaucoma—in one case in the infantile form known as buphthalmos, and in the other case as an acute glaucoma, complicating and doubtless resulting from the partial dislocation of the lens, being converted into a complete dislocation.

I have designated the generations as A, B, C, D, and E. It seems very probable that the male and sole representative of the A generation, who was blind twenty-five years previous to his death, may also have suffered from glaucoma complicating congenital cataract, and that his daughter, who was near-sighted from birth and lost the sight of one eye from inflammation at the age of thirty-five, was a victim of the same catastrophe, but it has, of course, been impossible to arrive at the accurate facts in these cases.


A. Male.
Blind twenty-five years previous to death at eighty-three.
B. Male, lost V of one eye by inflammation.
B. Female. "Near-sighted" from birth. Lost sight of one eye through inflammation and "wrong treatment" at age of 35.
B. Female. Injured her eyes by "coloring" when forty-five years of age. V gradually failed until it became very poor. Finally, after grippe, became totally blind.
C. (Case 2). Congenital partial dislocation of both lenses, finally becoming complete and causing glaucoma.
C. (Mrs. K. B.). ? Near-sighted from birth.
D. (Case 5). Congenital dislocation of lenses.
D. F. B. (Case 3). Congenital dislocation of lenses.
D. F. B. (Case 4). Congenital dislocation of lenses and buphthalmos.
D. Mrs. G. W. (Case 1). Congenital dislocation of both lenses.
E. Boy (Case 6). Congenital dislocation of both lenses (Dr. Lewis's patient).

SYSTEMATIC REPORT ON THE PROGRESS OF OPHTHALMOLOGY IN THE SECOND AND THIRD QUARTERS OF THE YEAR 1902.

By Dr. G. ABELSDORFF, in Berlin; Prof. ST. BERNHEIMER, in Innsbruck; Dr. O. BRECHT, Prof. R. GREEFF, Prof. C. HORSTMANN, and Dr. R. SCHWEIGGER, in Berlin:

WITH THE ASSISTANCE OF

Dr. A. Alling, New Haven; Prof. E. Berger, Paris; Dr. Dalén, Stockholm; Dr. J. Herrnheiser, Prague; Prof. Hirschmann, Charcow; Dr. J. Jitta, Amsterdam; Dr. Krahnstöver, Rome; Mr. C. Devereux Marshall, London; Dr. P. von Mittelstädt, Metz; Prof. Da Gama Pinto, Lisbon; Dr. Heinrich Schulz; and others.

Translated by Dr. Ward A. Holden.

(*Continued from page 414.*)

XII.—CORNEA, SCLERA, ANTERIOR CHAMBER.

342. **Keyser.** On a case of congenital greenish discoloration of the cornea. *Klin. Monatsbl. f. Augenheilk.*, xl., 11, p. 22.

343. **Augstein.** Vascular studies of the cornea and iris. *Zeitschr. f. Augenheilk.*, viii., 3-4.

344. **Koerber.** Remarks on the so-called nodular and grill-like corneal degeneration. *Ibid.*, viii., 3, p. 340.

345. **Wehowski.** On opacities of the cornea from folding. *Inaug. Dissert.*, 1901, Greifswald.

346. **De Vries.** Pyramidal cataract adherent to the cornea, with remarks on the thickness to which the membrane of Descemet may attain. *Graefe's Archiv*, liv., 3, p. 500.

347. **Knaebel.** On infantile keratomalacia. *Inaug. Dissert.*, 1901, Tübingen.

348. **Panas.** On certain dystrophies of the cornea and the limbus of the conjunctiva. *Arch. d'opht.*, xxii., 5, p. 293.

349. **Terrien.** Pathological anatomy and pathogenesis of congenital keratitis. *Ibid.*, p. 329.

350. **Mainzer.** A contribution to the knowledge of the etiology of parenchymatous keratitis. *Inaug. Dissert.*, 1901, Tübingen.

351. **Zur Nedden.** Clinical and bacteriological investigations on marginal ulcer of the cornea. *Graefe's Archiv*, liv., p. 1.

352. **Klein, S.** On posterior ulcer of the cornea. *Wiener. med. Wochenschr.*, 1902, No. 11.

353. **Panas.** Suppurative keratitis of infectious origin. *Arch. d'opht.*, xxii., 6, p. 357.

354. **Piroschkoff.** On the treatment of purulent affections of the cornea with the actinic solar rays. *Wjest. Ophth.*, 1902, May–June.

355. **Römer.** Clinical experiments in regard to a serum therapy of serpent ulcer after investigations on pneumococcus immunity. *Graefe's Archiv*, liv., p. 99.

356. **Menschig.** On linear cauterization of the eye. *Reichs-med. Anzeiger*, Sept. 12, 1902.

357. **Suroff.** On the question of transplantation of the cornea. *Russky Wratsch*, 1902, No. 29.

358. **Seggel.** The dependence of corneal astigmatism upon the conformation of the skull. *Arch. f. Augenheilk.*, xlv., 3, p. 161.

359. **Hirschberg.** A new operation for keratoconus. *Berl. klin. Wochenschr.*, 1902, 20, p. 475; and *Centralbl. f. prakt. Augenheilk.*, xxvi., p. 199.

360. **Janssen.** On the correction of keratoconus. *Compt. rend. de l'acad. des sciences de Paris*, May 5, 1902.

361. **Lodato.** Observations on the refraction and optical correction of keratoconus. *Arch. di Ottalm.*, ix., 5, 6.

362. **De Wecker.** Tattooing in place of prothesis. *Die ophth. Klinik*, vi., No. 12, 1902; and *Klin. Monatsbl. f. Augenheilk.*, xl., 374.

363. **Dor.** Cyst of the cornea. *Soc. d. sciences méd. de Lyon*, July, 1902.

364. **Gelpke.** On perforating wounds of the sclera, their treatment and prognosis. *Beiträge zur Augenheilk.*, 52, p. 132.

365. **Friedenwald, H.** Deposits on the posterior surface of the cornea; their clinical significance. *Centralbl. f. prakt. Augenheilk.*, xxvi., p. 266.

366. **Parsons, J. Herbert.** Annular scleritis. *Ophth. Review*, July, 1902.

367. **Jardine.** Opacity of the cornea in new-born children. *Brit. Med. Jour.*, April 5, 1902.

368. **Westcott.** An additional case of conical cornea in which vision was improved by convex cylinders. *Ophth. Record*, March, 1902.

369. **Parker, H. C.** Operative interference in corneal complications of gonorrhœal ophthalmia. Twelve cases. *Ophth. Record*, April, 1902.

In a man of twenty-three, KEYSER (342) saw a dark greenish brown discoloration of the periphery of the cornea, possibly congenital. Examined with the loupe the ring zone appeared as a

regular arrangement of fine yellow spots deep in the cornea. Both eyes were free from other changes.

AUGSTEIN (343), after making studies with the loupe on living eyes and pathological examinations, divided the pathological vessels of the cornea into subepithelial and lamellar, the different forms dividing dichotomously or in the birch-twig fashion, according to their location in the cornea. The subepithelial tend to disappear, the deep to remain permanently. All the lamellar vessels indicate an involvement of the uveal tract in the inflammatory process. In the resorption, both varieties of vessels exhibit a circulation of red blood corpuscles under the loupe. This is due to a slowing of the current.

WEHOWSKI (345), in two phthisical eyes in which the small cornea was diffusely cloudy and had deep stripes of denser opacity, found microscopically that the epithelium and Bowman's membrane were intact, the parenchyma not œdematous, the membrane of Descemet with the deep layers of the parenchyma corresponding to the stripes of dense opacity bulged backward, and the endothelium consisting of a single stratum of cells. This is the ordinary condition of folding of Descemet's membrane found in phthisical eyes. Efforts to produce the condition in rabbits were unsuccessful.

DE VRIES (346) examined an eye in which, presumably after a perforating central ulcer of the cornea, the lens was found to be attached to the cornea by a tract of tissue and the endothelium, and also the membrane of Descemet had passed over upon this tract as well as upon the lens. The case proves that the membrane of Descemet is a cuticular formation proceeding from the endothelium.

KNAEBEL (347) studied 27 cases of keratomalacia in infants under six months of age—15 boys and 3 girls, and believes that no specific micro-organism is the cause of the disease. In 3 cases, besides the xerosis bacillus, staphylococci were present, and in 1 severe case of general pneumococcus infection this was found in the cornea. An accompanying xerosis of the conjunctiva was wanting in but 3 cases. Of the 18 infants, mostly poorly nourished and with intestinal catarrh, 9 remained alive, but of the 13 affected eyes 11 became completely blind. The therapy consisted in improving the nutrition and using locally eserine, protargol, iodoform, hot fomentations, etc., yet the eyes grew worse.

As dystrophies of the cornea, PANAS (348) designated gerontoxon, pterygium, pinguecula, and "kératite chimique," a form due to hyaline degeneration, described by Kamocki (*Arch. f. Augenheilk.*, XXV., p. 209), which is cured by curetting the affected spots. Gerontoxon, when it comes on in the form of two concentric rings, is a sign of arteriosclerosis, gout, rheumatism, or alcoholism. Even in persons from twenty-five to forty years it indicates one of these affections. In order to show the relation between gerontoxon and pterygium, Panas cites the case of an arthritic patient who had in one eye a pterygium which extended to the double gerontoxon, the two rings of which came together at this point. Panas confirmed the observation of Takayasu, that sudan stains the arcus black, indicating its fatty nature, but in old cases he found hyaline deposits also. v. MITTELSTÄDT.

TERRIEN'S (349) patient was an infant, normally born, with white corneal opacities in both eyes. Death occurred on the eighth day. He found a pronounced thickening of the cornea, the anterior layers being but little changed and there being an extensive ulcer of the posterior surface with vascularization of the deeper layers. The iris lying close to the cornea had many granular formations in its anterior surface, and, like the rest of the uveal tract, a marked inflammatory infiltration. The choroid with venous hyperæmia was increased to three times its normal thickness.

The affection of the uveal tract, which was a torpid irido-cyclitis, was, in the author's opinion, the cause of the deep interstitial keratitis.

In a second infant, eight days old, the same affection of the uveal tract was found without involvement of the cornea.

In the first case syphilis could be excluded, but there had been albuminuria since the seventh month of pregnancy, so that the author attributes the affection to the disturbances of circulation in the fœtal eye. In the second case details are not given, yet here also there were disturbances in the placental circulation.

v. MITTELSTÄDT.

MAINZER (350) found in the Tübingen clinic parenchymatous keratitis, particularly between the ages of six and fifteen, chiefly in females. In 61 per cent. of the cases hereditary syphilis was found, and in 6 per cent. acquired syphilis. In many cases the etiology was not clear. There was no reason to suppose the existence of tuberculosis or any other etiological factor in any of the

cases. Hutchinson's teeth were found in only 26 per cent. of the patients with second teeth, and in 13 per cent. of those with their first teeth. In all these cases (39 per cent.) there were definite evidences of hereditary syphilis, so that these teeth may be regarded as a sure proof of the existence of hereditary syphilis.

ZUR NEDDEN (351) found a new bacillus in a series of thirty-three corneal ulcers of a catarrhal nature. The ulcers were near the margin of the cornea, crescent-shaped or oval, and sometimes in the form of scattered small infiltrations. These were not rapidly progressive and spread in a ring form rather than extended into the depth of the cornea. There was rarely hypopyon but often phlyctenulæ. In the latter also the author found the bacillus, which stood near the colon varieties. The bacillus was sometimes found with difficulty in the small ulcers, and was often not present where the author expected to find it. Again it was found, together with other bacilli, in severe ulcers but never in conjunctival or lachrymal secretion. When injected into the tissues, inoculation experiments resulted positively, and the author believes the bacillus to be the cause of marginal ulcers.

KLEIN (352) reports two cases of posterior ulcers of the cornea without the existence of anterior ulcers. These cases make it possible to understand the existence of anterior synechiæ after the healing of corneal ulcers without perforation and escape of the aqueous.

PIROSCHKOFF (354) used the treatment with the actinic rays of the sun, recommended by Nesnamoff, in 22 cases of corneal ulcer, mostly with hypopyon, and obtained complete recovery in 13 cases in from one to five sittings, in 8 cases not followed to the end considerable improvement, in 4 cases no change, and in 4 the ulcers grew worse. The treatment is not unpleasant to the patient. The sittings last from two to six or even eight minutes.

HIRSCHMANN.

RÖMER (355), in his exhaustive treatise, traces the introduction of experiments in immunizing against the pneumococcus and gives a critical review of previous studies. He had prepared by Merck a pneumococcus serum obtained from various species of animals which contained the greatest possible number of immunizing elements and brought us a step forward in the treatment of croupous pneumonia in man.

In the ophthalmological section of his paper he discusses the pneumococcus of Fraenkel in serpent ulcer and the possibility of

securing immunity or improvement by serum injections. Some clinical experiments on man were chiefly of interest in showing that injections of the serum did no harm. Their effect on serpent ulcer will require a great number of observations. Experiments on animals showed that the eye took part in the general immunization.

MENSCHIG (356) cured keratitis, iritis, and hypopyon by cauterizing the inferior cul-de-sac in a fine longitudinal line with the stick of nitrate of silver. He used also atropine and cocaine, hot fomentations and a bandage. The improvement always was noticeable the following day.

In order to secure better nutrition after transplanting a cornea, SUROFF (357) takes with the cornea a broad strip of surrounding conjunctiva. He splits the upper half of the cornea into two layers. The posterior layer is left in place, while the anterior layer of the upper half, with the entire thickness of the lower half of the cornea, together with the ring of conjunctiva, is transplanted to the other eye, which has been prepared in exactly the same way and an iridectomy done downward. This operation was done by the author in six hens, two dogs, and fourteen rabbits. In two-thirds of the cases the results were satisfactory both in regard to healing and in regard to the subsequent clearing up of the transplanted cornea, which at first is cloudy and then in the lower half clears up so far that the pupil becomes visible and the red reflex of the fundus can be seen. The upper split half of the cornea remains cloudy permanently.

HIRSCHMANN.

SEGGEL (358) found astigmatism against the rule chiefly in long faces, and astigmatism with the rule rather in broad faces (brachycephaly). He presents accurate measurements of a person with facial asymmetry and a correspondingly different astigmatisn in the two eyes.

HIRSCHBERG (359) believes that in place of the long-practised superficial cauterization of the apex of the cone with subsequent tattooing, tattooing alone is sufficiently helpful optically and organically, since it flattens the cone and prevents vision through it. In three or four sittings at intervals of two or three weeks he tattoos the apex, which usually lies beneath the centre of the cornea, and also a ring- or half-ring-shaped area of the pupillary region of the cornea, producing the optical effect of medicamentous miosis.

The improvement in vision is considerable and lasts for years. In many cases he flattens the apex with the galvano-cautery and tattoos the white scar. Opening of the anterior chamber is to be avoided.

JANSSEN (360) compares a cornea with keratoconus to a slightly curved cornea before which a parabolic lens is placed. Therefore keratoconus should be corrected by a lens whose anterior radius corresponds to the spherical anomaly of curvature and that of its posterior (parabolic) surface to the keratoconus.

BERGER.

DE WECKER (362) would as far as possible limit enucleation to cases of injury which threaten sympathetic inflammation, and to cases of tumor. Prothesis is reserved for eyes which have become small spontaneously or after operation. The shrinking according to de Wecker is not particularly noticeable after all the recti have been tenotomized. These become attached again and good motility is restored. The tattooing must be artistically done. After this procedure many patients can dispense with their artificial eyes.

DOR (363) presented a patient in whom there was on the right eye a cystic elevation of the corneal epithelium as large as a pea. Vesicles of this sort had appeared 20–30 times in this same patient. The elevation appears each time rather suddenly, increases in extent, and finally the vesicle bursts. Two years before, this patient had iritis. There are but two cases in the literature in which so large vesicles existed. BERGER.

FRIEDENWALD (365) found deposits on Descemet's membrane constantly in iritis and in 31 out of 38 cases of exudative choroiditis. The apparent serous iritis, therefore, is in connection with an exudative process which runs its course in some deeper part.

PARSONS (366) says this, unlike ordinary scleritis, is a disease of advanced age; all the recorded cases have been in people over sixty years of age, and most of them are women.

Both eyes are usually affected and the disease is very chronic. Many of the eyes are lost and can hence be readily examined. The disease commences at the corneal margin and spreads on both sides and in advanced cases reaches the equator posteriorly and invades the cornea anteriorly. Besides the cornea the uveal tract is usually inflamed, though this is probably a sequel rather

than a causal agent. The extreme chronicity of all forms of the disease point to a specific inflammatory process, the advance of which is doubtless impeded by the extreme resistance of scleral tissue to invasion of all kinds. MARSHALL.

JARDINE (367) draws attention to the cases of opacity of the cornea occurring in the new-born after forceps delivery, several cases of which have recently been reported at the Ophthalmological Society of the United Kingdom. He records two other cases.

In one he noticed immediately after birth a marked linear opacity running vertically across the cornea and a few fainter spots at one side. There was considerable hemorrhage into the anterior chamber. In the other case a faint opacity showed itself three days after delivery. He considers the condition caused by pressure with forceps and in most of the cases delivery was accomplished in the Walcher position. MARSHALL.

Of the twelve cases of Saemish operation for ulceration of cornea complicating gonorrhœal ophthalmia reported by PARKER (369), only one resulted in loss of the eye. In the others the cornea rapidly cleared. The operation is indicated when the ulceration is extending rapidly and tending to perforate.

ALLING.

Sections XIII.–XVIII. Reviewed by DR. O. BRECHT, Berlin.

XIII.—LENS.

370. **Stood.** Artificial ripening of senile cataract in the unbroken capsule by Förster's method. *Deutsche med. Wochenschr.*, xxviii., p. 448.

371. **Schmidt, Heinrich.** A case of recovery from panophthalmitis after cataract extraction due to the introduction of iodoform into the vitreous. *Zeitschr. f. Augenheilk.*, vii., p. 295.

372. **Terrien.** The manner of cicatrization of the capsule of the lens after injuries of that membrane. *Arch. d'opht.*, xxii., 7, p. 452.

373. **Wokenius.** A contribution to the subject of subconjunctival discission of simple secondary cataract. *Zeitschr. f. Augenheilk.*, vii., p. 277.

374. **Panas.** On operative intervention in cases of secondary cataract. *Arch. d'opht.*, xxii., 9, p. 549.

375. **Hocquard.** Anatomical study of a secondary cataract after extraction without inflammatory reaction in man. *Ibid.*, 7, p. 435.

376. **Cofler.** On rupture of the posterior capsule of the lens. *Ann. di Ottalm.*, xxxi., 3–5.

377. **v. Hippel, E.** On different forms of congenital cataract and their relations to one another. *Graefe's Arch.*, liv., p. 48.

378. **Pergens.** Lenticonus posterior in man. *Zeitschr. f. Augenheilk.*, vii., p. 451.

379. **Hubbell.** Jacques Daviel and the beginning of the modern operation of extraction of cataract. An address commemorative of the third semi-centennial anniversary of the publication of the first description of the operation. *Jour. Am. Med. Assoc.*, July 26, 1902.

380. **Hunter.** Two cases of hereditary congenital cataract with family history. General remarks on needling and discission in soft and secondary (membranous) cataract. *N. Y. Eye and Ear Infirmary Reports*, Jan., 1902.

381. **Suker.** Is the dislocation of the lens into the vitreous ever justifiable? *Am. Jour. of Ophth.*, June, 1902.

Stood (370) has done extraction 130 times after previously performing Förster's massage. Opacity of the lens came on most surely in cortico-nuclear cataracts, then in nuclear cataracts up to the sixty-fifth year, and less certainly in older people. Three cases of lamellar cataract in patients between forty and fifty remained unchanged. In 2 cases iritis serosa developed with sympathetic ophthalmia and loss of the second eye; in 3 cases there was injection which could not be attributed to the operation. The resulting vision was on the average better than in cases of spontaneous ripening. Secondary cataract is found twice as often in the cases artificially ripened. The author recommends the procedure for unripe cataracts, exclusive of the lamellar and nuclear forms, up to the age of sixty-five.

Schmidt (371), in an infected eye after extraction which would have been destroyed, obtained a good result by introducing iodoform into the vitreous, and he recommends this procedure in suitable cases.

Terrien (372) shows that even in clean linear wounds of the anterior capsule produced by the narrow knife without causing opacity of the lens, there is no actual healing of the margins of the wound, but a sort of interstitial tissue is produced by the subcapsular epithelial cells, upon which, even without a preceding iritis, pigment masses may be found. v. Mittelstädt.

Wokenius (373) on the basis of 244 operations for secondary cataract done in the Koenigsburg University eye clinic, recommends Kuhnt's procedure of subconjunctival discission in simple secondary cataract and the subconjunctival operation with two knives in the spongy form of secondary cataract. The vision increased on an average from 19 per cent. to 52 per cent., perfect vision being regarded as 100 per cent. Disturbed healing occurred in 22 cases (or 9 per cent.), and glaucoma was never observed. The advantages of the operation are to be sought for in the avoid-

ance of disturbing the uveal tract and of deep injury of the vitreous, as well as in the making of a single large split in the membrane.

In place of discission of secondary cataract, which is often difficult to perform, unsatisfactory in result, and followed frequently by cyclitis, glaucoma, and detachment of the retina, PANAS (374) recommended extraction, which he had done with good results for years, an operation performed in the eighteenth century by Pellier de Quengsy.

After opening the anterior chamber with a lance, making a section 8–10*mm* broad at the corneal margin, Panas introduced a forceps resembling Liebreich's, one branch of which ended in a sharp point that pierced the secondary cataract, and when the forceps were closed the membrane was included between the branches, and after being gradually loosened was extracted. Disturbances of the ciliary body are not to be feared since the zonula fibres always rupture at the margin of the secondary cataract. In case of adhesions, an iridectomy may first be done or an iridocapsulotomy. The bad results that follow discission were very rarely observed by Panas in a series of at least a thousand operations for secondary cataract. v. MITTELSTÄDT.

HOCQUARD (375) found, in seven eyes from which a cataract had been extracted, a marked broadening of the anterior capsule due to the traction of the zonula fibres, so that the capsule almost touched the ciliary processes. From this he concluded that a narrowing of the circumlenticular space cannot be the cause of glaucoma and that the zonula fibres are normally in a continued state of tension. The anterior capsule, after its division with the cystitome, often rolls outward. The zonular attachments are always clearly recognizable. Just as in young animals with injuries of the lens there is found in patients operated on for cataract a proliferation of the subcapsular epithelium with the formation of lens fibres. The process in the latter case, however, is much slower and irregular and does not reach a high grade.

The portions of the lens left between the two sheets of capsule and portions of the nuclear zone form the true secondary cataract, which is to be distinguished from the secondary cataract due to exudation upon the capsule following iritis. In cases of very thin secondary cataract a simple incision is alone necessary and the traction of the zonula fibres widens this. This action of the zonula fibres is wanting when there are posterior synechiæ

and in cases of thick secondary cataract. In such cases the great resistance is due to the tissue of fibrous nature arising from the subcapsular epithelium and the occasional calcified myelin. In extracting secondary cataract, in case strong adhesions to the iris do not exist, one need not fear traction upon the ciliary body, since the capsular sac always comes away without zonula fibres, and either is torn itself or is separated from the zone at their place of insertion from the zonula fibres which remain attached to the ciliary body. v. MITTELSTÄDT.

COFLER (376) reports a case of rupture of the posterior capsule after the action of blunt force upon the eye, which is of the greater interest from the fact that three years before the injury a polar cataract (congenital ?) was diagnosed. The rupture seems undoubtedly to have been due to the injury.

KRAHNSTÖVER.

v. HIPPEL (377) found in three young rabbits of the same brood in all six eyes which showed, four weeks after birth, congenital changes as follows: capsular cataract in six, with chalky deposits in three, pronounced central cataract in two, and complete cataract in three. Furthermore, in all six eyes there were ribbon-shaped corneal opacities, more or less pronounced posterior synechiæ, and a displacement inwards of the pars ciliaris retinæ and the ciliary processes. The author assumes an inflammation to have been the cause of all the changes.

PERGENS (378) found, accidentally, in an eye long blind and enucleated for glaucoma, a lenticonus posterior with a rupture of the capsule near the posterior pole. The nucleus was displaced backward. There was no trace of a hyaloid artery.

HUNTER (380) speaks of a family consisting of sixteen individuals, eight of whom had double congenital cataracts. He uses a narrow Graefe knife for discission of secondary cataract, repeating the operation in second and third sessions. ALLING.

There has been a recent revival of the obsolete method of treating cataracts by couching. SUKER (381) takes the position that the operation may sometimes be advisable among the following cases: the insane, epileptics, hæmophilics, tremulous or fluid vitreous without choroiditis or retinitis, incurable dacryo-cystoblennorrhœa or conjunctivitis, extreme old age, incurable bronchitis and cough, where one eye was lost by suppuration and indications point to same fate for other, in shrunken and secondary

cataracts—*i. e.*, secondary to some inflammatory reaction, in partial posterior dislocations with tremulous iris. While granting that the procedure should be an exceptional one, he believes that it has a place in ophthalmic surgery. ALLING.

XIV.—IRIS.

382. **Panas.** Gummata of the ciliary body, particularly early ones. *Arch. d'opht.*, xxii., 8, p. 485.

383. **Sawitsch.** A case of atypical coloboma of the iris. *Wojenno Med. Journ.*, June, 1902.

384. **Praun.** Triangular defect in the iris after injury. *Centralbl. f. prakt. Augenheilk.*, xxx., p. 269.

385. **Friedenwald.** Tuberculosis of the iris. *Amer. Medicine*, July 5, 1902.

386. **Alt.** On intraocular epithelial new formations. *Amer. Journ. Ophth.*, Apr., 1902.

PANAS (382) reported two observations of gumma of the ciliary body, which made their appearance in the secondary stage together with iritis. The prognosis is bad even when the patient is treated early with iodides and mercury. Panas prefers the intramuscular injection of an oily solution of biniodide of mercury. Complete recovery may take place.

Even in cases in which it is uncertain whether the disease is gumma or tuberculosis the same treatment is indicated, since tuberculosis being a bacillary disease is favorably influenced by it.

He reported, also, two cases of specific iritis in which there were numerous synechiæ without particular signs of irritation or pain, but with occasional increase in tension and blurring in vision and limitation of the field. Panas attributes this form of glaucoma less to the iritis than to vascular changes due to syphilis. Treatment with biniodide of mercury may perhaps render operation unnecessary.

The coloboma of the iris in SAWITSCH'S (383) case was horizontal. No intraocular changes. H = 2.5; V = $\frac{20}{30}$.

PRAUN (384) saw eight years after a blow with a whip a triangular defect of the iris, the portion of the lens behind it being cloudy and somewhat shrunken, while elsewhere it was clear. There was a small yellowish-white, black-margined patch in the macula.

The case reported by FRIEDENWALD (385) was in a boy of sixteen who showed serous iritis with synechiæ, hypopyon, and whitish elevations on the iris together with punctate keratitis. Transplantation experiments in the eye of a rabbit were negative. The tubercles disappeared. The other case, a man of twenty-two, presented typical miliary tubercles of the iris with keratitis punctata. Although a syphilitic, lesions supposed to be tuberculous were found in pleura and pericardium at autopsy. ALLING.

ALT (386) contends that there is no doubt but that epithelial new growths can and do occur primarily within the eyeball, springing from the two epithelial layers of the ciliary body or the iris. On the whole they seem to be of benign character.

ALLING.

XV.—CHOROID.

387. **Greeff.** Tuberculosis of the choroid. *Fortschritte der Medicin*, 1902, 17.

388. **Stock.** A case of solitary tubercle of the choroid. *Vereinsbericht der Münch. med. Wochenschr.*, 1902, No. 25, p. 1067.

389. **Schmidt-Rimpler.** Diagnosis of sarcoma of the choroid. *Münch. med. Wochenschr.*, 1902, No. 29.

390. **Fehr.** Pigment deposits upon the iris and membrane of Descemet as an early symptom of sarcoma of the choroid. *Centralbl. f. prakt. Augenheilk.*, xxvi., p. 129.

391. **Darocque** and **Petit.** Sarcoma of the choroid invading the orbit, the frontal sinus, and the infero-orbital canal. Exenteration of the orbit. Curettage of the sinus. Recovery. Intraorbital injections of vaselin. *Rev. méd. de Normandie*, Oct., 1901.

392. **Steffens.** On an angioma of the choroid, with extensive ossification and teleangiectásis of the face. *Klin. Monatsbl. f. Augenheilk.*, xl., 11, p. 113.

393. **v. d. Hoeve.** Remarks on bilateral coloboma of the choroid in the macular region. *Ned. Tydschr. v. Geneesk.*, ii., No. 5, 1902.

394. **Krauss, F.** A clinical and pathological report of two cases of choroidal sarcoma, diagnosed in the first stage and removed by enucleation. No recurrence. *Annals of Ophth.*, July, 1902.

GREEFF (387) gives a résumé of our present knowledge of tuberculosis of the choroid. Miliary tuberculosis was described in 1858 by Manz and is a frequent and well-known affection. Chronic tuberculosis has recently excited more attention; it appears either as a diffuse inflammation or as a circumscribed tumor. Greeff agrees with v. Michel that the ordinary chorioretinitis disseminata is frequently to be considered a tuberculous

affection when other causes cannot be found, or when several members of a family have tuberculosis, or when there is any evidence of pulmonary tuberculosis. A solitary tubercle may lead to detachment of the choroid or retina, so that in cases of spontaneous detachment of the retina, one must bear in mind the possibility of a tuberculous tumor of the choroid.

STOCK's (388) case was in a girl of seventeen, with pronounced tuberculosis at the apices and tuberculous pleuritis, who had long complained of failing vision in one eye and for four days had been blind. The eyeball appeared unchanged. In the choroid one saw a large white, nodular tumor springing from a spot beneath the disc, and below it a floating detachment of the retina. The absolute clearness of the media and the lack of irritation were remarkable. Microscopic examination revealed tuberculosis with great numbers of giant cells and central caseation. In the retina, disc, and distant portions of the choroid small tubercles were found. The surrounding tissues were but little infiltrated. On the outer side of the sclera there was a small collection of leucocytes and a slight increase of nuclei in the optic nerve. The vitreous was free. This case supported the view that solitary tubercle of the choroid almost always is associated with tuberculosis of other organs, while this is not the case with tuberculosis of the iris and the appendages of the eye.

SCHMIDT-RIMPLER (389), in view of the difficulty of distinguishing between sarcoma of the choroid and subretinal cysticercus and simple detachment in cases of circumscribed choroiditis, suggests the methodical use of the sound, with which it is possible to make out the increased resistance of the sclera which often exists at the site of the tumor, and this may be done even at the posterior pole after making a small incision into the conjunctiva.

FEHR (390), fifteen months before the diagnosis was made of a melano-sarcoma of the choroid extending into the ciliary body, found deposits of pigment on the iris and Descemet's membrane. After the enucleation, preceded at the wish of the patient by a puncture, there was recurrence in the conjunctiva notwithstanding the careful removal of the punctured spot. The author concludes that pigment deposits in eyes which have not been injured, inflamed, or degenerated should excite suspicion of tumor.

DAROCQUE and PETIT (391) report on a case of sarcoma of the choroid in a woman of thirty-eight, in which the tumor had

entered the orbit, frontal sinus, and infraorbital canal. It was possible to remove the tumor completely, and an attempt was made to transplant a rabbit's eye, but this was unsuccessful. Then vaselin was injected into the orbit according to Gersung's method and in this way a satisfactory stump was obtained for the introduction of an artificial eye. BERGER.

STEFFENS (392) found in a man of nineteen, besides a large vascular nævus of the left half of the face, a large partly ossified angioma of the choroid in the left eye with apparently secondary changes, such as a deeply excavated atrophic optic nerve, calcification of the shrunken lens, partial thickening of the ciliary muscle apparently due to teleangiectasis and scleritis.

V. D. HOEVE (393) observed a case of coloboma of the choroid in the macular region. Since the retina functionated well and was well nourished, he concluded that, since the chorio-capillaris was wanting, the retinal vessels were able to nourish the macula. JITTA.

XVI.—VITREOUS.

395. **Stadfeldt.** Idiopathic recurrent hemorrhage into the vitreous. *Bibl. f. Laeger.*, April, 1902.

396. **Hirota.** Bacteriological investigations on panophthalmitis. *Zeitschr. f. Augenheilk.*, vii., p. 459.

397. **Jennings.** A remarkable vascular growth into the vitreous. *Annals of Ophth.*, July, 1902.

STADFELDT'S (395) patient, a man of thirty-six, became blind suddenly in the left eye without any apparent cause. Four and a half months later he noticed a failure of vision in the other eye, and in six weeks this eye was entirely blind. The history threw no light upon the cause of the affection. When examined, extensive hemorrhages into the vitreous were found. Therapy, including foot-baths, rest in bed, a pressure bandage, salicylates, iodide of potassium, and subconjunctival injections of salt solution, was of no avail. Two years after the beginning of the trouble, when all treatment had been given up, the sight of the right eye began to improve, and in the course of some months rose to $\frac{6}{12}$. At the same time the blood in this eye became absorbed. In the left eye no improvement took place.

The author discusses the various views as to etiology, symptomatology, course, prognosis, and treatment of idiopathic, recurrent juvenile hemorrhage into the vitreous. DALÉN.

HIROTA (396), in three cases of panophthalmitis with suppuration in the tear sac, found in the pus from the eye the pneumococcus of Fraenkel in pure culture or nearly so, both in the beginning and two or three weeks later when the pneumococci proved to be very virulent for white mice.

The growth described by JENNINGS (397) consisted of three vessels which passed from the optic nerve to a small patch of transparent connective tissue in the vitreous. The vessels then subdivided, forming a delicate and extensive meshwork. The growth disappeared, but the vitreous became disorganized and the sight was lost. There was a previous history of hemorrhagic retinitis in the case. ALLING.

XVII.—GLAUCOMA.

398. **Neese.** Glaucoma operations according to Jonnesco and v. Graefe's iridectomy. *Centralbl. f. pr. Augenheilk.*, xxvi., p. 105.

399. **Strzeminski.** Glaucoma following acute iritis. *Recueil d'ophtal.*, xxiv., p. 516.

400. **Venneman.** Remarks on a case of buphthalmus. *Soc. belge d'ophtal.*, April 26, 1902.

401. **Querenghi.** On glaucoma and its operability without iridectomy. *Tribuna medica*, Jan.–Feb., 1901.

402. **Spartaro.** On the treatment of hydrophthalmus. *La clinica oculista*, June, 1902.

403. **Ziehe** and **Axenfeld.** Resection of the sympathetic in glaucoma. C. Marhold, Halle a. S., 1901.

404. **Hoor.** The indications for resection of the sympathetic in glaucoma. *Arch. f. Augenheilk.*, xlv., p. 277.

405. **Hoor.** Contributions to the subject of resection of the sympathetic in glaucoma. *Wien. klin. Wochenschr.*, xv., No. 36, p. 907.

406. **Rohmer.** Some observations on sympathectomy in glaucoma. *Ann. d'ocul.*, cxxvii., p. 328.

407. **Rohmer.** On extirpation of the ciliary ganglion. *Ibid.*, cxxviii., p. 1.

408. **Terrien.** A case of extirpation of the ciliary ganglion. *Bull. de la soc. de chirurg. de Paris*, April 23, 1902.

409. **Taylor, C. Bell.** A case of acute glaucoma. *Lancet*, Nov. 22, 1902.

410. **Friedenwald.** Notes on the visual field in glaucoma. *Annals of Ophth.*, April, 1902.

411. **Webster.** Sclerotomy, anterior and posterior. When indicated in glaucoma. Method of operating. *Med. News*, May 17, 1902.

412. **Burnett, Swan M.** The manner of making an iridectomy in acute glaucoma. *Am. Jour. of Ophth.*, April, 1902.

413. **Standish.** A compilation of thirty-two cases of glaucoma reported to the New England Ophthalmological Society since its foundation. The danger of mydriasis. *Ophth. Record*, May, 1902.

NEESE (398) treated a woman with subacute glaucoma who apparently had had the corresponding sympathetic ganglion removed and a sclerotomy done. He did an iridectomy and relieved the unbearable pain for over a year. When the tension increased again and occipital pains returned, these were relieved by sclerotomy. The author concludes with Axenfeld that resection of the sympathetic is indicated only in simple glaucoma and when iridectomy has been unsuccessful. In absolute glaucoma it is to be avoided.

The interesting report of VENNEMAN (400) is not adapted for an abstract. Of particular importance may be mentioned the results of his pathological examinations, which show that the most extensive changes in the external ocular membrane lie in the sclero-corneal zone. The latter is so distended that Descemet's membrane ends 4–5*mm* external to the peripheral end of Bowman's membrane. Fontana's spaces are greatly dilated and the meshwork is very well marked. Schlemm's canal is filled with blood and distended longitudinally. In the cornea only the posterior layers have a lamellar structure, the anterior layers consisting of an irregular fibrous network with greatly changed corneal corpuscles.

QUERENGHI (401) under complete miosis passes a narrow Graefe knife into the posterior chamber *2mm* behind the corneal margin, and after perforating the sclera he depresses the handle of the knife and pushes the blade 5–6*mm* farther, then with a sawing motion he cuts through the choroid from within outward. In this manner the author believes that he provides a sufficient communication between the posterior chamber and the choroidal space. In a number of cases of glaucoma he obtained good results.

KRAHNSTÖVER.

SPARTARO (402) gives extensive incision of the angle of the anterior chamber the preference over all other operative methods in hydrophthalmus and obtains good vision.

KRAHNSTÖVER.

ZIEHE and AXENFELD (403) in their monograph of eighty-four pages treat in a clear and exhaustive fashion of the timely question of resection of the sympathetic in glaucoma. After reporting

in detail upon 5 cases so treated in the Rostock clinic, they add 50 cases collected from literature. Their conclusions are: the operation is not dangerous, only one death having occurred in seventy-four patients operated upon; pareses of the upper lids or of the muscles of swallowing are transient. Some of the eyes are improved for months; in others the condition remains stationary, in others no benefit is derived from the operation Direct injury, however, has not been observed. Resection is not indicated in acute inflammatory glaucoma except when iridectomy is refused, or had acted badly in the first eye, or when, in spite of iridectomy, the glaucoma recurs or progresses. In hemorrhagic glaucoma resection may be tried. In chronic inflammatory glaucoma and in simple glaucoma resection is indicated after iridectomy in chronic cases. Extirpation of the sympathetic without iridectomy is generally contra-indicated and is only justified: (1) when iridectomy or iridotomy is refused; (2) when iridectomy has injured the other eye; (3) in hemorrhagic glaucoma; (4) in simple glaucoma with marked diminution of vision; and (5) in hydrophthalmus after multiple sclerotomies. Resection in cases of absolute glaucoma is only indicated when the blindness has existed but a short time, or when the affected eye is the last. It is uncertain whether resection has a prophylactic effect. After-treatment with miotics is always advisable. When the process advances in spite of iridectomy, resection should be done soon, since it apparently acts better in an early stage of the disease than in a later.

Hoor (404) discusses the monograph of Ziehe-Axenfeld. These authors and others advise resection of the sympathetic when an acute inflammatory glaucoma recurs or goes on after an iridectomy. Hoor advises in such cases sclerotomy first, when this is not efficacious a second iridectomy, and then, if necessary, the resection of the sympathetic. Hoor agrees with the others in regard to simple glaucoma. He advises extirpation when the vision is considerably decreased, and especially when the field of vision is much narrowed, since iridectomy then mostly works injury and sclerotomy often checks the process and sometimes cures it. In glaucoma in children he has seen good and lasting results from sclerotomy, and he considers this operation indicated until good effects shall have been obtained from extirpation of the sympathetic.

Hoor's (405) case was one of simple glaucoma in a patient of

sixty-four. A sclerotomy in each eye had a transitory effect lasting only twenty months. Resection of the left superior cervical ganglion and of the entire right cervical portion of the sympathetic caused in the better eye an improvement in vision of from $\frac{6}{36}$? to $\frac{6}{18}$ and an increase of about 5° in the field of vision. The vision in the right eye, amounting to movements of the hands, remained unchanged. The period of observation was three months.

ROHMER (406) did sympathectomy for glaucoma in seventeen cases, in many of them on both sides. A pupil of Rohmer's in his inaugural dissertation collected all the cases in the literature in which this treatment was employed. Rohmer tabulates his results as follows:

	Number	Improvement	Transient or no Improvement	Aggravation
Glaucoma simplex . . .	43	36	5	2
Glaucoma chron. inflam. .	39	23	10	1
Glaucoma subacut. . .	14	6	6	2
Glaucoma acutum . . .	9	4	5	—
Glaucoma hemorrhag. .	5	5	—	—
Hydrophthalmus . . .	6	4	1	1

Apparently the results were best in glaucoma simplex, of which five-sixths were improved; also in chronic inflammatory and in infantile glaucoma (hydrophthalmus) the results were good, since in two-thirds of the cases improvement was obtained; on the contrary, the operation in acute and subacute glaucoma is, in accord with previous observations, of doubtful value. BERGER.

TERRIEN (408) recommends in many cases of absolute glaucoma the extirpation of the ciliary ganglion by means of Krönlein's method instead of enucleation. He states that it is not difficult to find and remove this ganglion—a statement somewhat surprising to those of us who have sought for it, often in vain, in the dead body.

The patient whose case is recorded by TAYLOR (409) was a woman who twelve years ago lost the sight of the right eye from glaucoma fulminans. Six years ago, when she was sixty-seven years of age, an acute attack came on in the left eye and all perception of light was abolished. This condition lasted for three weeks when Bell Taylor saw her. He at once did an iridectomy, and she regained sufficient sight to enable her to go about unat-

tended and to read the newspaper with moderate fluency. This condition of things still remains.

FRIEDENWALD (410) describes a case of glaucoma which presented a defect in the inferior nasal quadrant of the field of vision, extending from the periphery, in the form of a narrow tongue-like prolongation, into the blind spot. Such peculiarities in glaucoma were first pointed out by Bjerrum. ALLING.

By posterior sclerotomy WEBSTER (411) was able to relieve a patient, ninety years old, of pain due to hemorrhagic glaucoma. ALLING.

BURNETT (412) opens the anterior chamber from without by a succession of strokes with the point of a Graefe knife. After puncture the incision is completed with a blunt-pointed knife or scissors. ALLING.

XVIII.—SYMPATHETIC OPHTHALMIA.

413A. **Osaki.** Pathological examination of a sympathizing eye, with remarks on the development of sympathetic choroiditis. *Arch. f. Augenheilk.*, xlv., p. 126.

414. **Asayama.** Complete microscopic examination of a case of sympathetic ophthalmia. *Graefe's Archiv*, liv., 3, p. 444.

415. **Vail.** A case of sympathetic ophthalmia, with complete recovery of both eyes. *Amer. Jour. of Ophth.*, June, 1902.

OSAKI (413A) found, in an eye affected with sympathetic chorioretinitis, peripheric round or irregular spots in the retina, at first yellow-white then becoming red, some so small as to be barely perceptible, others $\frac{1}{8}$ p. d. in diameter. These increased in size and number during the course of the disease and finally disappeared in part.

Only a few points need be noted from the paper by ASAYAMA (414) since in general his results correspond with those usually found. In the eye secondarily affected, no bacteria were found nor any tubercle bacilli, although their presence was suspected and the patient died of tuberculosis of the lungs. The optic nerve exhibited just behind the ball inflammatory changes, but farther back and in the chiasm these were wanting. The suprachoroidal space in the posterior half of the ball was completely obliterated by new-formed spindle-celled tissue. There were no giant or epitheloid cells. In the iris were numbers of small hyaline globules, which are perhaps to be regarded as a later stage of the bodies described by Schirmer.

VAIL (415) reports the case of a boy of fourteen in which sympathetic ophthalmia developed seven weeks after a penetrating wound at the sclero-corneal margin. The second eye presented minus tension, deep anterior chamber, iris off-color, posterior synechiæ abundant, vision $\frac{20}{30}$, optic-nerve head slightly swollen. Under treatment both eyes cleared, and one year later vision was normal in both. ALLING.

Sections XIX.–XXII. Reviewed by DR. v. HASELBERG, Berlin.

XIX.—RETINA AND FUNCTIONAL DISTURBANCES.

416. **De Bono.** Complete acute bilateral amaurosis from alcoholic intoxication, with symmetrical ophthalmoscopic changes. *Arch. di Ottalm.*, ix., 3–4.

417. **Basso.** Bitemporal hemianopsia with pathological report in a case of acromegaly. *Ann. di Ottalm.*, xxxi., 1–2.

418. **Greeff.** On the tubular form of visual field in hysteria. *Berliner klin. Wochenschr.*, No. 21, 1902.

419. **Michel, Georg.** A contribution to the knowledge of septic retinitis. *Inaug. Dissert.*, Tübingen, 1902.

420. **Birch-Hirschfeld.** Further contributions to the pathogenesis of alcohol amblyopia. *Graefe's Archiv*, liv., 1, p. 68.

421. **Jocqs.** The prognostic value of hemianopic limitations of the visual field in tabic patients. *Ophth. Klinik*, 1902, No. 18.

422. **Grandclément.** Detachment of the retina treated with dionin. *Bull. de la soc. d. sciences méd. de Lyon*, May, 1902.

423. **Josserand.** Cortical blindness. Absence of pupillary reaction. *Ibid.*, March, 1902.

424. **Raehlmann.** On the ophthalmoscopic diagnosis of sclerotic retinal vessels. *Zeitschr. f. Augenheilk.*, June, 1902; and on endarteritis obliterans of the retinal vessels and its relation to embolism of the central artery of the retina. *Ibid.*, May, 1902.

425. **Bard.** A case of alexia of operative origin. *La semaine méd.*, No. 18, p. 196, 1902.

426. **Barrett, J. W.** Sudden temporary loss of vision, probably of circulatory origin. *Ophth. Review*, Oct., 1902.

427. **Reynolds.** Toxic amblyopia. *Amer. Jour. of Ophth.*, May, 1902.

428. **Weeks.** Ganglionic neuroma of the retina. *N. Y. Eye and Ear Infirmary Reports*, Jan., 1902.

429. **Posey.** Transient monocular blindness. *Jour. Amer. Med. Assoc.*, May 31, 1902.

430. **Zimmermann.** Two cases of hysterical monocular diplopia. *Ophth. Record*, July, 1902.

De Bono's (416) patient was a man of forty, a heavy drinker, whose vision had been good until he drank ½ litre of strong spirits and woke up blind the next morning.

The lids were open, the cornea transparent, but sensibility almost wanting. Pupils 6.5*mm* wide and not responsive to light. Motility of the eye normal. Two days later a light could be recognized but not located. The ophthalmoscopic changes were absolutely symmetrical in the two eyes and involved chiefly the temporal segment of the disc, which was occupied by a yellowish-gray mass, which extended laterally 1 p. d., and above and below 2 p. d. over the retina, covering the vessels and appearing slightly striated in the periphery. The arteries were pale and narrow, the veins full and in places having six times the diameter of the arteries. No hemorrhages. No changes at the macula.

Treatment with derivatives and strychnine improved the condition, but the visual field remained concentrically contracted; there was a relative central scotoma. L disc normal, R pale, and white in its nasal segment. Arteries narrow. Slight perivasculitis. R V = ⅓, L V = ½. Krahnstöver.

Basso (417) now gives a pathological report on the optic nerves in a case of acromegaly previously reported in life. There had been typical bitemporal hemianopsia, but this was intermediate between a slight disturbance of vision and almost total blindness, affecting first the left and then the right eye. Examination could not be made of the place of apposition between the tumor of the hypophysis and the chiasm. The secondary descending degeneration was found in various stages from the degeneration and absence of the nerve fibres to the hyperplasia of the neuroglia and the septa. The most advanced degeneration was found nearest the lamina cribrosa. Krahnstöver.

Greeff (418) reported the case of a girl with various hysterical symptoms, who exhibited the tubular form of visual field, there being equal concentric contraction at 1 and at 5*m*, differing from the more common funnel-shaped field.

Michel (419) reported a case of general sepsis, with old metastatic irido-cyclitis in one and fresh septic retinitis in the other eye. Throughout the retina and optic nerve were foci of inflammation and of hemorrhage, but no micro-organisms could be found.

Birch-Hirschfeld (420) has extended his earlier studies on the effect of methyl-alcohol on the eyes of rabbits and chickens,

now using dogs and monkeys, into the stomachs of which methyl-alcohol was repeatedly introduced by means of a stomach tube.

He found again the degeneration of the retinal ganglion cells previously described, long before any pathological changes were discoverable in the optic nerves. In one monkey the picture of optic neuritis appeared and an extensive degeneration of the nerve was found. He believes that in ethyl-alcohol amblyopia also the primary changes are in the nervous and not in the connective tissue.

Jocqs (421), from the study of three cases, calls attention to the unfavorable results of the hemianopic visual disturbances in tabic patients, which are rare, but lead to almost complete blindness as soon as the point of fixation is reached.

In a patient with high myopia and detachment of the retina, Grandclément (422) noticed, after the instillation of a few drops of 5 % dionin solution, chemosis, lachrymation, and pain. The next day the retina was in place again, but became redetached. This occurred several times after the use of dionin. Finally, after a subconjunctival injection of salt solution, a permanent reattachment of the retina took place. In the discussion, Dor stated that he had observed an improvement in detachment of the retina after instillations of dionin. Berger.

Josserand (423) observed a very noteworthy case of cortical blindness. A modiste became blind suddenly while at work. Vision returned, however, so that she was able to go home alone. Then the vision gradually diminished and in two weeks the patient was completely blind. The interior of the eye was normal. There was no reaction to light. The patient died with symptoms of marked cachexia. At the autopsy the author found bilateral softening of the occipital lobe, the cuneus being involved, while the lingual and fusiform lobules were healthy. There was advanced atheromatous degeneration of the basilar and of the posterior cerebral artery.

The lack of light reaction, notwithstanding the views of Wernicke, may not exclude the existence of cortical blindness. Dejerine also fails to find in all cases of cortical hemianopsia a reaction to light, agreeing with Wernicke's theory. Berger.

Raehlmann (424) presents several drawings of sclerotic retinal vessels and recommends the erect image for diagnosis. He calls attention to the great importance of such examinations as indicating the condition of the cerebral vessels.

BARD (425) reports a remarkable case of right homonymous hemianopsia which came on suddenly in a man of fifty-six. Epileptic attacks came on at the same time, although there were no evidences of increased intracranial tension, and trephining was performed by a surgeon. Nothing abnormal being found on the surface, an experimental incision was made, and this allowed the escape of a quantity of liquid, coming perhaps from a cyst. A drainage tube was introduced and an antiseptic dressing applied. The patient tore off the dressing and pulled out the tube. After the operation, the epileptic attacks reappeared, the hemianopsia remained unchanged, and there developed an alexia verbalis sed non litteralis, which apparently was due to a lesion caused by the operation or the insertion of the tube, and presumably consisted in the destruction of association fibres or in changes produced at a distance (Fern-wirkung). BERGER.

BARRETT'S (426) patient was a man, aged sixty, who lay down to sleep after lunch. On awakening two hours later he found the right eye was quite blind. He repeatedly tested it, and about six P.M. he found he could see the flame of a candle. Gradually it appeared as if a curtain were lifting from before the eyes, and an hour later he could see as well as ever. When examined the next day, the only thing noticeable was that the superior nasal vein was constricted near the disc. The disc was perhaps a trifle paler than that of the other side. The point of interest was that the vision after two hours' obscuration was restored to the same as it was before the attack. MARSHALL.

REYNOLD'S (427) contribution consists of the record of a case of nearly total blindness as the result of drinking essence of cinnamon, a typical case of auto-toxæmia, and four cases of tobacco amblyopia in persons who had never taken alcohol. ALLING.

WEEKS (428) describes a small tumor found in the nerve-fibre layer of the retina. It consisted of irregularly oval cells loosely set in stroma of nerve fibres and Müller's fibres. The cells had the appearance of ganglion nerve cells that had undergone slight degenerative changes. Ganglionic neuromas are of extremely rare occurrence. ALLING.

POSEY (429) relates five cases which in general showed attacks of total or partial monocular blindness without other symptoms or findings. Cause is regarded as vascular and comparatively innocent. ALLING.

XX.—OPTIC NERVE.

431. **Schieck.** Clinical and pathological studies on the intoxication amblyopia. *Graefe's Archiv*, liv., 3, p. 458.

432. **Elschnig** and **Goldberg.** Histological artefacts in the optic nerves. *Klin. Monatsbl. f. Augenheilk.*, xlv., 2, p. 81.

433. **Pagenstecher.** On tumors of the optic nerves. *Graefe's Archiv*, liv., p. 300.

SCHIECK (431) had the opportunity of examining, sixteen hours after death, the optic nerve in a case of toxic amblyopia of nine weeks' duration. He found a marked increase in connective tissue and many new vessels, some of which exhibited thickening of the intima, increase in glia nuclei, and particularly of the endothelial cells and connective-tissue cells. Connective-tissue processes had grown into the nerve bundles, but there was no evidence of strangulation of the bundles of nerve fibres, only spaces into which the connective tissue had extended.

ELSCHNIG (432) showed by a series of experiments on the cadaver that the changes in the optic nerves, described by Siegrist, depend chiefly upon crushing during enucleation in life or from the cadaver, or upon the chiselling down upon the nerve so that it can be removed. If, after carefully chiselling through the roof of the orbit, one removes the optic nerve with the uninjured optic canal, and removes the bone only after hardening the specimen, the changes are not found. Elschnig believes that the changes found by Otto in arterio-sclerosis depended upon the same error.

PAGENSTECHER (433), after a review of the literature, reports three cases of tumor of the optic nerve. One was an endothelioma, the second was of doubtful nature (glioma or myxosarcoma), and the third was probably a sarcoma. Pure neuroma of the optic nerve does not seem to exist.

XXI.—INJURIES, FOREIGN BODIES, PARASITES.

434. **Mayweg.** On magnet operations. *Klin. Monatsbl. f. Augenheilk.*, July, 1902.

435. **Cofler.** On the extraction of bits of iron from the anterior portions of the eye with a magnetized lance. *Ann. di Ottalm.*, xxxi., 1–2.

436. **Cramer, E.** A case of complete recovery from siderosis of the ball. *Klin. Monatsbl. f. Augenheilk.*, 1902.

437. **Panas.** Traumatic injury of the extrinsic muscles of the eye. *Arch. d'opht.*, xxii., 4, p. 229.

438. **Panas.** Traumatic ruptures of the sclera. *Arch. d'opht.*, xxii., 7, p. 422.

439. **Rosenberg.** Injuries of the eye in the Tübingen clinic between 1896 and 1900. *Inaug. Dissert.*, Tübingen, 1901.

440. **Hartmann.** Injuries of the eye in the Tübingen clinic in 1900. *Inaug. Dissert.*, Tübingen, 1901.

441. **Puccioni.** Amaurosis and amblyopia of traumatic origin. *Bull. della R. accad. med. di Roma*, xxvii., 4, 5, 6.

442. **Haab.** The removal of foreign bodies from the eye. *Journ. Amer. Med. Assoc.*, Aug. 30, 1902.

443. **Standish.** The removal of bits of steel from the interior of the eye. *Ibid.*

444. **Sweet.** Foreign bodies in the eye. *Ibid.*

445. **Chance.** The clinical and pathological report of a case of foreign body retained in the eye for twenty-six years. *Ophth. Record*, March, 1902.

Mayweg (434) has done 92 operations with the hand and giant magnets since 1892, in addition to 158 done previously. In general he had better results with a meridional section (47 cases) than with the giant magnet and extraction from the anterior chamber after section with a lance (25 cases). In the former series, good results were obtained in 21 cases, and in the latter in but 6 cases. Enucleation was required in 9 cases.

Cramer (436) found total siderosis of the ball in a man who was not aware of any previous injury. The sideroscope revealed the presence of iron. Extraction with the hand magnet, and ten days later removal of dust-colored lens fibres lying on the iris. Passing off of the siderosis. $V = \frac{6}{15}$.

In Panas's (437) first case, a man of thirty-two was struck on the lower lid, just above the floor of the orbit, with a piece of wood, and without any apparent injury suffered a rupture of the tendon of the superior rectus muscle, causing an annoying diplopia, which was relieved by an advancement. In the second case, the patient was struck with the horn of a cow and had, besides a wound of the lower lid, a rupture of the inferior rectus between the tendon and the belly of the muscle. Recovery after advancement. In the third case, the point of a stick entered the inner angle of the eye and symblepharon resulted. The advancement of the adherent internal rectus with tenotomy of the external rectus produced little effect.

Panas describes these infrequent injuries and studied on the cadaver and in animals the conditions under which they arise. He was never able to tear the tendon from the ball but only to rupture the belly of the muscle. He accepts the view of Malgaigne that in order to tear the tendon the muscle must be in a

state of contraction, and that if contraction does not exist the muscle itself is torn. v. MITTELSTÄDT.

PANAS (438), presenting several observations, discusses the scleral ruptures arising from contrecoup after the action of a blunt force. These always ran equatorially in the thinnest portion of the sclera in the region of Schlemm's canal. When the force acts from before, there is frequently in young persons a meridional rupture of the cornea, which, continuing into the sclera, assumes an equatorial direction. A straight rupture of the cornea and sclera speaks against the action of a blunt force, which may be of medico-legal importance.

Wherever the resistance of the sclera is lessened, as in sclerochoroiditis anterior, a rupture may readily occur. The prognosis is unfavorable. There is danger also of sympathetic ophthalmia, which Panas has observed in nine cases of open, and eight cases of subconjunctival, rupture. In open wounds, scleral sutures are indicated, as they are in subconjunctival wounds, which are gaping; in cases of staphyloma, excision and suture. A lens luxated under the conjunctiva may be removed later if necessary.

After a trauma with commotio cerebri, PUCCIONI (441) observed immediate blindness of the right and amblyopia of the left eye, the latter recovering. The blow had been on the left side of the head, and the writer believes the cause to have been probably a hemorrhage from indirect fracture of the base.

KRAHNSTÖVER.

HAAB (442), in an address before the Ophthalmological Section of the fifty-third annual meeting of the American Medical Association, classifies foreign bodies found in the eye under two heads: magnetic and non-magnetic. Owing to the difficulty in extracting the latter, it is often advisable to leave these particles in the eye, since the injury produced by the operation might be greater than that from the foreign body left in its place. At times Demarres's capsule forceps are of use when the splinter is free and visible in the vitreous. Magnetic bodies are best removed with the Haab magnet. The author's technique is as follows: The patient is brought into such a position that the point of the magnet is opposite the centre of the cornea, in order that the splinter may pass directly to the lens and not be drawn into the ciliary region, from which its extraction would be difficult. When the iris begins to bulge, the current should be cut off, since under no conditions should the foreign body be drawn through

the iris. With the exercise of skill and patience the splinter may usually be drawn through the pupil. If the splinter should stick behind the iris, a small incision may sometimes be made at the periphery of the cornea and the iris torn away from its root, forming a dialysis. When in the anterior chamber, the foreign body can be extracted with the magnet through a suitably placed incision. Even foreign bodies which enter through the sclera are best removed by the method just described. Out of 165 cases of the author, the operation failed in only 23. The failures were in great part due to the fact that the splinters were too firmly imbedded or had become covered with exudate. To combat infection, he recommends the inserting of rods or tablets of iodoform-gelatine into the wound. ALLING.

STANDISH (443) reports a series of eight cases in which bits of steel were driven through the cornea and lens and removed with a Haab magnet without making an incision in the sclera.

ALLING.

SWEET (444) has constructed a medium-sized magnet 10¾ inches long by 2½ inches in diameter. The core tapers towards the end, which adds to its strength. ALLING.

In the case of CHANCE (445), the eye had contained a foreign body for twenty-six years, and during this period there was useful vision. After recent injury, an inflammatory attack necessitated enucleation. This attack was probably rendered more severe by the presence of degeneration. The foreign body was found in the position previously demonstrated by a radiograph.

ALLING.

XXII.—OCULAR DISTURBANCES IN GENERAL DISEASES.

446. **Widal.** The Argyll-Robertson pupil and lymphocytosis of the cerebro-spinal fluid. *Soc. méd. des hôpitaux de Paris*, July 22, 1902.

447. **Dejerine.** Argyll-Robertson pupils in a patient with hypertrophic-peripheral neuritis. *Soc. de neurologie de Paris*, June 5, 1902.

448. **Jaffray** and **Schrameck.** The relations between irregularity of the pupil and the Argyll-Robertson pupil. *Bull. de la soc. de neurol. de Paris*, March 13, 1902.

449. **Dufour.** The relations between pupillary disturbances, syphilis, tabes, and general paresis. *Bull. de la soc. méd. des hôpitaux de Paris*, June 13, 1902.

450. **Petit.** Palpebral and conjunctival manifestations occurring in the course of intracranial affections. *Ann. d'oculistique*, cxxviii., p. 209.

451. **de Lapersonne.** Optic neuritis in diseases of the brain. *Gazette des hôpitaux*, 1902, p. 425.

452. **Pauly.** Double occipital softening, absence of the pupillary reflex. *Bull. de la soc. des sciences méd. de Lyon*, March, 1902.

453. **Chaillons.** Pupillary disturbances in patients with aortic dilatation. *Ann. d'oculistique*, cxxviii., p. 28.

454. **Ballet.** Multiple sclerosis with ocular disturbances. *Bull. de la soc. de neurol. de Paris*, May 15, 1902.

455. **Brissaud** and **Péchin.** Cerebral syphilis simulating general paresis. Jacksonian epilepsy. Dysarthria. Ocular paralyses. Diagnostic value of ocular symptoms. *Arch. d'opht.*, xxii., 8, p. 489.

456. **Schimamura.** Is there an endogenous toxic infection of wounds of the eye? *Klin. Monatsbl. f. Augenheilk.*, xlvi., p. 273.

457. **Singer.** On disturbances of vision after hemorrhage. *Beiträge z. Augenheilk.*, 53.

458. **Purtscher.** A case of metastatic ophthalmia. *Centralbl. f. prakt. Augenheilk.*, xxvi., p. 257.

459. **Mohr.** Ocular symptoms of iodoform poisoning. *Arch. f. Augenheilk.*, xlv., p. 184.

460. **Jones, R. Llewelyn.** Contracted visual fields in rheumatoid arthritis. *Brit. Med. Jour.*, Nov. 29, 1902.

DEJERINE (447) observed in a case of peripheral hypertrophic neuritis the existence of the Argyll-Robertson symptom, which he in all the cases he has observed has attributed to syphilis. In the discussion, Jaffray combatted this idea, stating that he had observed the development of the Argyll-Robertson pupil in cases of aortic disease. Brissaud and Raymond had found unilateral Argyll-Robertson pupil in cases of tabes. BERGER.

JAFFRAY and SCHRAMECK (448) found in a number of patients with tabes or paresis that an irregular form of the pupil was to be observed earlier than the Argyll-Robertson symptom. The former symptom is therefore of great diagnostic importance.

BERGER.

DUFOUR (449) examined the pupils of eleven hundred patients, among the number being ninety-nine who had unquestionably formerly had syphilis. Inequality of the pupils does not indicate syphilis, but an irregular form of the pupil is of greater importance, while the Argyll-Robertson pupil allows one to conclude with certainty that the patient has syphilis or a parasyphilitic disease such as tabes or paresis. In the discussion, P. Marie stated that he regarded the Argyll-Robertson pupil as an evidence of the existence of a lesion in the posterior columns of the cord, which may be of non-syphilitic nature. BERGER.

PETIT (450) observed a case of brain syphilis in which, besides a right homonymous hemianopia and right hemiplegia, a neuralgia of the right fifth nerve developed and later a neuralgia of the left. Petit considers noteworthy the sudden appearance of œdema of the lids and chemosis of the right side which the other symptoms followed. All the symptoms except the hemianopia disappeared after energetic treatment by inunctions of mercury. No similar case has been reported, but Salemi has noticed hyperæmia of the conjunctiva in the insane during the period of agitation, and Morax observed an inflammation of the conjunctiva in an epileptic during the attacks. BERGER.

DE LAPERSONNE (451) observed in a girl of twenty-two, with increased frequency of the pulse and increased arterial tension, without any determinable disease of the heart, a bilateral hydrophthalmus, which with pain led to blindness in the right eye and a diminution of vision to one half in the left. An iridectomy on the right (blind) eye had only a transient effect. But after removal of the superior cervical ganglion on each side the right eye became free from pain, and the tension fell to normal in both eyes, while the tachycardia and abnormal arterial tension were greatly relieved.

The writer calls attention to the combination of circulatory disturbances and hydrophthalmus which perhaps exists oftener than is supposed. The case reported seems to support the view of Gallenga and Angelucci, who regard a congenital dilatation of the vessels with increased excretion of liquid as the cause of hydrophthalmus. v. MITTELSTÄDT.

PAULY (452) observed in a man of seventy-six bilateral blindness with a normal interior of the eyes and absence of pupillary reaction to light. At the autopsy, foci of softening were found in both occipital lobes, while the optic nerves and corpora quadrigemina were entirely normal. In the debate, Jaboulay stated that he believed that when cortical lesions existed, particularly when they were bilateral, functional disturbances in the mesencephalic nerve nuclei might develop as distant symptoms, and in this way he would explain Pauly's case. BERGER.

CHAILLONS (453) believes that the generally accepted idea of the inequality of the pupils in aortic aneurysm is not proven. Among seventy-four cases demonstrated before the Paris Anatomical Society, inequality of the pupils was noticed only five times. From two observations of his own (right ophthalmoplegia

interna and dilatation of the aorta, myosis and the Argyll-Robertson symptom with aortic aneurysm), the writer concludes that in all cases of aortic aneurysm with pupillary disturbances both are to be regarded as symptoms of syphilis. BERGER.

BALLET (454) observed as initial symptoms in a case of multiple sclerosis, uniocular polyopia, and paralysis of associated movements to the left; five years later, diplopia came on, and one year later, disturbances of speech. Fifteen years after the beginning of the disease, the paralysis of associated movements toward the right still existed and there was paralysis of convergence.

BERGER.

The interesting case reported by BRISSAUD and PÉCHIN (455) was in a man of forty-two, who had been treated for syphilis twenty-one years before and now presented symptoms of progressive paralysis, which began with scintillating scotoma, headache, and attacks of Jacksonian epilepsy. The last became frequent and finally the right arm was paralyzed. After some intramuscular injections of an oily solution of biniodide of mercury, the symptoms cleared up completely. Then there developed on the right side complete paralysis of the abducens, incomplete of the facial, as well as ptosis and partial ophthalmoplegia interna, which were referred to endarteritis at the base, and thus spoke against the diagnosis of progressive paralysis. There was complete and permanent recovery and the patient was able to resume his work. v. MITTELSTÄDT.

SCHIMAMURA (456), working under Axenfeld's direction, was unable to produce reaction in an ocular wound by injecting filtrates of Bact. coli comm., Bact. pyocyan., and Staphyl. aureus beneath the skin, into the veins, or into the peritoneal cavity. Contrary results must be explained by ectogenous infection.

SINGER (457) collected one hundred and ninety-eight cases of visual disturbance after hemorrhage and grouped them according to age, sex, time of onset, recovery or improvement, etc. Visual disturbances are most frequent after hemorrhage from the stomach —40.2 %, and next in frequency after uterine hemorrhage —32.8 %. The amount of blood lost is not of great importance; small hemorrhages may cause serious visual defects. Most frequently the disturbance comes on from three to ten days after the hemorrhage; in 87.6 % both eyes are affected; the visual field shows all possible changes, but chiefly peripheric contraction, hemianopia,

and central scotoma. Ophthalmoscopically there is often found optic neuritis at first and atrophy later.

PURTSCHER (458) describes a metastatic ophthalmia with orbital abscess in a case of pneumonia of the upper lobes. The pneumococcus was found almost in pure culture in the vitreous. He explains the simultaneous appearance of pus in the orbit and in the ball as being due to a double infection.

MOHR (459), after a general description of all the symptoms of iodoform poisoning, reports a case in a boy of thirteen, who received in ten weeks 230 *g*. of 10 % iodoformol by injection for a tuberculous coxitis. In the eleventh week, there came on suddenly vertigo, papillitis, paralysis of the abducens, contraction of the visual field. The ultimate vision was $\frac{4}{7}$. In a second case, a similar condition followed the administration of the same amount of the drug. There was no central scotoma.

JONES (460) has for the last year been investigating the visual fields in cases of rheumatoid arthritis, complicated with Raynaud's disease. The fields of fifty such cases were taken and all showed some—though a variable—amount of contraction. After the inhalation of nitrite of amyl, they all increased, but in none did they reach the normal; the remote periphery seemingly has undergone structural changes as a consequence of oft-recurring periods of blood famine. MARSHALL.

BOOK REVIEWS.

VII.—**The Practical Details of Cataract Extraction.** By H. HERBERT, F.R.C.S., Eng. Major I.M.S., Professor of Ophthalmic Medicine and Surgery, Grant Med. College; in charge of the Sir Cowasjee Jehangir Ophthalmic Hospital, Bombay; 109 small 8vo pages. London: Baillière, Tindall & Cox, 1903.

The author begins his preface with the following words: "This account of cataract extraction and of matters bearing upon it differs from others in that it is largely made up of a mass of practical detail, ordinarily omitted, and it includes a certain amount of original observation throughout. I have attempted to record what I have learnt from the performance of between 2000 and 3000 operations, and from teaching, both in the lecture theatre and in hospital, since 1895."

An account of so many operations done and reported by one man cannot but be very instructive, especially if, as it is here the case, the author is a well-informed oculist and a clear writer. The reviewer has read the book attentively from one end to the other and would fain give an extensive analysis of it if the limit of a notice permitted. He can only say that the nicely gotten up and unpretentions little volume must prove so highly valuable to every operating ophthalmologist that he will wish to read it himself.

The results of cataract operations depend so much on a multitude of nice details not usually found in even the larger text-books, that we all may be thankful to the author for giving us access to the sources of his experience. He is one of those teachers that after the description of the phenomenon, feel impelled to inquire into its causes. Some of his arguments invite discussion, though all

appear plausible. The first chapter (fifteen pages), under the title "Operable Cataract," treats of the varieties of cataract, their stages of maturity, and indications for treatment. In tabular form he presents the volume of cataractous lenses at different ages, obtained with the aid of Priestley-Smith's lens-measurer. Chapter II. — description of the operation — begins with these words: "The path of success in this, the capital operation in eye surgery, is so beset with pitfalls and hedged in with difficulties and dangers, that even the experienced surgeon can scarcely hope to maintain throughout quite 100 per cent. of good results in uncomplicated cataracts only." He details the preparation of the patient (asepsis, etc.); the preliminaries; the instruments, their quality, how to test and preserve their sharpness (he uses a good deal an irrigator according to McKeown); the initial steps; cocaine ten minutes, the patient lying on a suitable table or bed, or reclining on an operating chair. His preference is the combined upward extraction, with a small central conjunctival flap, opening the capsule by *one vertical* incision with a cystotome (which is open to criticism), expulsion of the lens, its difficulties and accidents (especially prolapse of vitreous), the toilet of the eye, the dressing and after-treatment. Chapter III: Discussion of the operative technique, and the alternative procedures. He has made a considerable number of simple extractions, and though he does not favor it he sums up: "Thus, the question, essentially one of compromise, is gradually working itself out in the selection of management of cases." With this sentence all operators, *familiar* with both methods, will agree: it is a question of indications, with a variable personal oscillation where the balance-sheet will be on the side of the experience of the operator.

After describing and criticising the tearing off the centre of the anterior capsule he says (p. 63): "In direct contrast to the tearing away of the anterior capsule is Knapp's and Gayet's *peripheral incision* in the upper part of the capsule, parallel with the corneal section, designed to keep lenticular *débris* enclosed, away from contact with the iris. The much greater frequency of after-cataract requiring treatment condemns this practice." There is a misunderstanding on the part of the author: the horizontal incision in the upper part of the capsule is not designed to keep away from the iris lenticular *débris*, but to prevent the contact of the raw edges of the shreds of capsule with the fine lacerations of the sphincter-edge of the iris caused by the passage of the cataract

through the pupil, this contact producing the synechiæ between iris and capsule through agglutination of raw surfaces. The reviewer, at this place, desires only to assure the author that the peripheral incision admits of as easy and thorough evacuation of the capsular sac as any other opening of the capsule.

Very interesting is the author's following citation: "CAPTAIN SMITH, I.M.S., with his 1651 extractions *within the capsule*, at Jullundur in the Punjab, with only 8.2 % of vitreous escape. He is the chief latter-day exponent of this operation [usually associated with the name of Pagenstecher, in Europe], which has long found favor in that province, remarkable in providing for a few surgeons an experience in cataract work far greater than is to be got anywhere else in the world.

Chapter IV.—"the after-complications" treats in detail of the infective processes, irido-cyclitis, non-infective iritis, prolapse and incarceration of the iris, expulsive retro-choroidal hemorrhage, after-cataract, secondary glaucoma, detachment of the retina, transient detachment of the choroid (Fuchs, p. 92), concluding with statistics of indifferent and bad results. Complicated and soft cataracts, extraction in high myopia (one page, 101), dislocated lenses, the extraction of soft cataract, and an index conclude this very instructive monograph. H. K.

VIII.—**A Manual of Diseases of the Eye, for Students and General Practitioners.** By CLARENCE A. VEAZEY, A.M., M.D. 12mo, 410 pages, with 194 engravings and 10 colored plates. Lea Brothers & Co., Philadelphia and New York. $3.50.

This book is judiciously prepared, carefully written, and conveniently gotten up. Though following the usual arrangement of the galaxy of "text-books of Diseases of the Eye for Students and General Practitioners," the subject-matter is admirably selected and adapted to the class of readers to which it appeals. They will find in it all that the most rigorous examiner could ask, and later, when they are in practice and want to read up on an eye case, their text-book can scarcely fail to impart to them all the information needed.

The bulk of the treatise is devoted to the organic diseases of the eye, as it ought to be. He gives only 42 of the 410 pages to the normal and abnormal refraction and accommodation, and he does the subject justice. Important as this department is for the ophthalmic specialist, we cannot demand from a general

practitioner to determine how far the cerebral symptoms and manifold functional distress of a patient that has a degraded constitution and leads an unwholesome life depend on errors of refraction. As far as the eyes are concerned, he should be able to recognize their external and internal organic diseases as well as their functional anomalies, including refraction and motility; but intricate problems of the latter he may fairly be allowed to refer to the specialist.

We said the book was conveniently gotten up. We mean that the publishers took care to help the student in reading and understanding it. The text is legible; the heavy-face at each paragraph indicates the subject-matter conspicuously, makes rehearsals easy, and aids memory; the profusion of plates (nearly all of which, however, are borrowed), act in the same way.

The book can be heartily recommended. H. K.

IX.—**The Refraction and Motility of the Eye, for Students and Practitioners.** By WILLIAM NORWOOD SUTER, M.D., Assistant Surgeon Episcopal Eye, Ear, and Throat Hospital, Washington, D. C. 12mo, 390 pages, illustrated. Lea Brothers & Co., Philadelphia. $2.00.

This book goes over the physical part of ophthalmology, that which commonly offers the beginner a great deal of difficulty, and therefore it may appropriately be set apart for particular study. A certain amount of elementary geometry and algebra is necessary to understand its contents as well as to solve the problems encountered daily in ophthalmic practice. The book, if patiently and thinkingly gone through, will lay a solid foundation to unravel the complicated and frequently occult conditions presented by the numerous cases of refractive and motor anomalies of the eye. Even when the student has overcome these difficulties, he will have to go through a prolonged drill to make himself familiar with the many optical apparatus and other means of diagnosis, besides acquiring the requisite dexterity in operating. Without an extensive stock of theoretical knowledge, nobody could be proficient in treating the diseases of refraction and motility. To acquire that knowledge, Dr. Suter's book can be heartily recommended. It is well written, tolerably up-to-date, and sufficiently complete for the ophthalmic practitioner.

We may be permitted to point out one inaccuracy. Page 196, in indicating the axis of a cylinder-lens after the ordinary method,

he illustrates, Fig. 59, the method which is very popular in Europe and considerably used in this country—viz., to count the meridians from the upper end of the vertical meridian of each eye and designate the degrees as nasal and temporal down to 90°. He calls this "Bisymmetrical method." There is a symmetrical method, but no bisymmetrical. Symmetry is a term of stereometry, and means that a body can be bisected by a plane in such a way that one-half represents in all its points exactly the reflex image of the other. The eyeball cannot be split in such a way by any plane. The figure used by the author has symmetrically placed *numbers*, but they indicate meridians which are by no means equal in their curvature. If, for instance, 45° nasal indicates the meridian of strongest curvature, the meridian 45° temporal is the one with the weakest curvature. The author adds: "The diagram is for the left eye; the notation is reversed for the right." This is not so. The notation is the same for both eyes; the nose is always on the medial side of the body, the temple on the lateral. All we have to do is to put an R under the *right* eye, and an L under the *left*. Moreover, it is indifferent if we look at the glass from in front or from behind.

There is in and outside of literature a good deal of confusion on the subject of symmetry. Our visual apparatus is a dual organ. If you put a mirror between the two halves of it, the one is rigorously the reflex image of the other—cast by the median plane of the *body*—in their whole extent, the brain included. With regard to the meridians of the eyes, they are as nearly symmetrical (about 80%) as the two nostrils, or, better still, the two hands. The identical meridians are symmetrically placed (inclined) to the median plane of the body, but not to any plane of the eyeball.

H. K.

X.—**Squint: Its Causes, Pathology, and Treatment.** By CLAUD WORTH, F.R.C.S. John Hale, Sons, & Danielson, London. 12mo, 129 pp., illustrated. 6 *s. net.*

The monograph of Mr. Cl. Worth is written in the form of a text-book, containing a good deal that is generally known, but the greater part is original, based on a very large personal experience, which serves him in the discussion of the statements of other authors and time-honored opinions, as well as in supporting the validity of his arguments and the preference of his new methods of treatment. That squint is not a disease but only a

symptom, which he puts forcibly forward as being the statement of "most text-books," has been taught for at least five decades. In 1528 cases of convergent strabismus he has found the abduction of each eye perfect in 81 %. Among his practice he had a great many infants and very young children. The defect of abduction was less uncommon the longer the deviation had existed. He goes very carefully through all the symptoms and phases of squint. We can select only a few examples to show how he handles his subject. (P. 36.) "When the macula [by disuse] has ceased to be the most sensitive part of the retina, the eye then wanders, without remaining steadily in any definite position (*lost fixation*); or it may fix with some part of the paracentral region, or with a point of the extreme periphery (*false fixation*). . . . If an eye with *false macula* be put straight by operation, crossed diplopia is produced. If with a false macula central fixation is preserved and the fixing eye is covered, *monocular diplopia* is the result. This condition is exceedingly rare. In my detailed notes of more than 2000 cases of squint of all kinds, I found this anomaly only four times." He asserts (p. 39) that "there is rarely some congenital amblyopia," for he can prevent it with his "amblyoscope," an instrument with which the preponderance of the macula lutea can be preserved, if it is used soon after the beginning of the deviation. When this treatment was delayed, the amblyopia increased with the duration of the squint. Hyperopia is one of the causes of squint, of which the principal one is a partial or total absence of the fusion-sense (fusion-faculty—desire to binocular vision, p. 57). His method of investigating squint is fully detailed in Chapter VI., p. 80, etc. The acuteness of sight he determines by letting small children run after ivory balls of different sizes ($\frac{1}{2}''$–$1\frac{1}{2}''$) thrown on the floor. The fusion-faculty he examines, almost always with his amblyoscope, a stereoscopic instrument through which slides can be seen under distances different from one another. The results are excellent when the treatment is begun very early; the best age for fusion training is between three and five years. After six years it is seldom worth while to attempt fusion training at all. A disastrous practice is to atropinize both eyes. The straight eye ought to be atropinized, but not the deviating one, which should use and develop its sight both for near and far. When prevented through atropine, the function of the macula will deteriorate.

The treatment, non-operative and operative, is described very explicitly, with tables and many case-histories to illustrate the methods of operating and their results. The wearing of glasses from earliest youth, tenotomy or advancement alone, or both combined, the minutiæ of the procedures, especially his method of advancement, are depicted and explained with the greatest accuracy.

Very interesting and judicious is his description of heterophoria: eso-, exo-, hyper-, and cyclophoria. For determining their degree he uses Maddox rods and prisms. As the author here and there uses unusual words, the reviewer begs leave to make a few suggestions: for plus- and minus-cyclophoria, he would say nasal and temporal cyclophoria; for adversion and abversion, inversion and eversion [the *e* before a consonant, ex = out].

In conclusion we would like to express our opinion that Mr. Worth's treatise is original, full of ideas, and rich in useful diagnostic and therapeutic points. We think that every ophthalmic surgeon ought to read it. H. K.

XI.—**The Ocular Circulation.** By J. Herbert Parsons, B.S., B.Sc., F.R.C.S. (1903), Curator, Royal London Ophthalmic Hospital. John Hale, Sons, & Danielson, London. 12mo, 76 pages, illustrated, 3 *s.*

This brochure is the publication of a recent course of lectures. The first part treats *on the circulation of the eye*, beginning with the *lower mammals*, as all experimentation must be made on these, and then he takes up man. It is essential to determine the differences which obtain. The rabbit and the dog are particularly dwelt upon. The blood-supply is illustrated by numerous outline drawings, pointing out the vascular connections of the brain and the orbit, then the intraocular circulation, those of man, of course, receiving the greatest attention. The anatomy at the end of the optic nerve is illustrated and described according to Leber, and is very instructive. The intraocular circulation is presented by very fine drawings of the pecten of birds, the dog's retina injected in low and in higher power, showing perivascular spaces, particularly the arterial, being devoid of capillaries, from preparations by Hendersen. The uveal circulation is interestingly described and copiously illustrated.

The second part treats of the *physiology of the ocular circulation:* the blood-pressure in arteries, veins, and capillaries in the eye,

compared with that of the orbit and the cranial cavity; the intraocular and intracranial pressure — the skull being an hermetically sealed box; the secretions, the liquor cerebri being a small quantity, just enough to serve as a lubricant. Then follow elaborate expositions on the influence of vasomotor nerves, with numerous pulse tracings, all based on delicate and varied experiments.

The third part considers the *relations of the intraocular to the intracranial circulation*, — the causes and effects of increased pressure in either, separately and both together.

The fourth part deals with: (a) *Some physiological and pathological anomalies of the ocular circulation.* Arterial and venous pulsation are well known; the normal pulsation of arteries is damped by the humors of the globe and transmitted to the contents of the globe and the plastic sclerotic, with the effect that the increase of the arteries becomes too small to be observed by ordinary ophthalmoscopic magnification. Capillary pulse is seen only in aortic regurgitation as a systolic reddening and a diastolic paling of the disc. (b) *Embolism of the retinal arteries.* (c) *Section of the central retinal vessels.* (d) *Glaucoma.* (e) *Toxic amblyopias.* With regard to the last the author says: "I have elsewhere (*Brit. Med. Jour.*, June 8, 1901) advanced the view that tobacco amblyopia is the result of two chief factors, viz.: (1) a toxic effect on the nerve cells, leading to paralysis of some of the retinal elements; (2) a vascular effect, causing vaso-constriction of the retinal arterioles. The effect of nicotin upon nerve cells is first excitatory, and secondly paralytic."

The contents of this brochure are principally anatomical, physiological, and pathological researches, based chiefly on dissection and experiment. They appeal particularly to the ophthalmologist of scientific training and analytical disposition, but also the ophthalmic surgeon will derive a good deal of benefit from Mr. Parsons's monograph. H. K.

XII.—**Klinischer Leitfaden der Augenheilkunde.** Von Dr. JULIUS V. MICHEL, Professor der Augenheilkunde in Berlin. Dritte umgearbeitete Auflage. J. F. Bergmann, Wiesbaden. 16mo, 480 pages.

This little volume, in small but clear and legible type, is a marvel of completeness and condensation. Its title—*Clinical Guide*—means that it contains everything that may occur in the largest eye hospital or in the practice of the most popular oculist, and that it will be found described in terse language. It is a book for refer-

ence as well as for elementary study. The division of larger and smaller type distinguishes the fundamental from the higher knowledge, whereas the heavy type indicates the classification of the material, and the spaced type sets off the words and sentences upon which the author lays particular stress. An unusually detailed alphabetical, double-columned index of subjects stamps the volume as an unfailing work of reference. If, in conclusion, we state that this third edition has brought the *Clinical Guide* up to date—proof, the adoption of a partial crossing of the optic nerves (p. 297),—we can assert that the author has produced a text-book unexcelled in its kind, and manifested himself as the worthy official successor of A. von Graefe and C. Schweigger.

H. K.

XIII.—**Entre Aveugles.** Conseils à l'usage des personnes qui viennent de perdre la vue. Par le Dr. ÉMILE JAVAL, Directeur Honoraire du Laboratoire d'Ophtalmologie de l'École des Hautes Études, Membre de l'Académie de Médecine. 16mo, 208 pages. Price, frs. 2.50. Masson & Co., 120 Boul. Saint-Germain, Paris.

Dr. E. Javal, the famous ophthalmic scientist, who, together with Dr. Schioetz, has modified Helmholtz's ophthalmometer in such a manner that it has found its way from the laboratory into the examination-room of every eye hospital and every ophthalmic practitioner, if not in every country, certainly in America, suffered many years from glaucoma, which blinded one eye more than ten years ago, and the other three years ago, in spite of the care of most competent oculists. His blindness (in his sixty-second year) was neither sudden nor unforeseen by his attendants and himself. His exceedingly active mind before and immediately after the advent of this calamity, resignedly set to work to use the remainder of his faculties to the best advantage for himself and others. The little book before us is the report of his endeavors and their astonishing results. He at once concluded to continue his active life, aided by the eyes of other people, using his other senses and his mental and economical resources. He describes how a blind man can keep himself independent, attentive, and safe in the house and on the street, useful in many ways, clean, healthy, and with good manners, even at the dinner-table, provided the maid be taught to put the plates and other things before him in the right places. He can attend to his watches and clocks, walk with a cane in the city and in the country, ride a bicycle tandem — his portrait, riding on such a vehicle with a

companion, is used as a frontispiece of the book,—and undertake long journeys. Of all these achievements he cites remarkable examples. To be read to is one of the greatest resources of the blind, but how inferior to personal reading! He appreciates the satisfaction a blind person feels in the preservation of his handwriting. He describes and illustrates (p. 88) one of the writing machines for the blind which he presented to the "Académie de Médecine" April 3, 1901. He favorably mentions the fountain pen, an American invention. He advises young blind persons to learn typewriting. He writes that in many American mercantile houses the principal dictates at the phonograph to his clerk, who afterward brings him the typewritten copy. "Nothing prevents a business man or an author who has become blind from using the phonograph in this way." He says he gladly avails himself of the phonograph. "It seems that the gramophone, quite a new invention, is much superior to the phonograph."

The remainder of the book treats of the alphabet and the reading of the blind, embossed letter-signs, system Braille; marriage, memory and mnemotechnique, and psychology of the blind; music, games, and the use of tabac for the blind; and the sixth sense, "the sense of obstacles," of the blind. The author cites many published examples of the existence of such a sense, but he speaks of it with great reserve. He has no personal evidence of it in his own case.

The book is interesting, gives many suggestions and rules to oculists, how they should treat and comfort people that are blind or getting blind. H. K.

XIV.—**Golden Rules of Refraction.** By ERNESTE MADDOX, M.D., F.R.C.S., Ed. Bristol: John Wright & Co. Small pocket size, 87 pages. Price, 1 *s.*

This little book is one (No. XII.) of the Golden-Rule Series. The distinguished author, to whom we are indebted for a number of valuable investigations and useful devices in refraction and motility, prefaces his booklet as follows: "This tiny volume, composed at the request of the publishers of the Golden-Rule Series, is intended chiefly for the help of general practitioners who may be commencing the study of refraction. It supposes little knowledge of optics; its calculations are of the simplest kind, and it may be regarded as a miniature of a subject to which only a large volume could do justice. It is suggested as a good plan for a beginner that he should test his tools somewhat criti-

cally, for which rules are given, that he may become interested in them and form their acquaintance before use." This reads quite well, but the so-often-appealed-to general practitioner that touches refraction is a rare bird; on the other hand, we are of opinion that the little volume is of very great value to another class of medical men, the ophthalmic surgeon who has not only resolved his didactic and hospital courses in refraction and motility, but has tried his wings in the *practice* of this department. To him the terse description of the multitude of fine details, not found so completely even in the "large volume," will be of inestimable value. He will find here all he needs, and we know nobody that could instruct and guide him better than the author. Besides the younger oculists, the older ones also will read the little volume of condensed wisdom and experience with interest and profit. H. K.

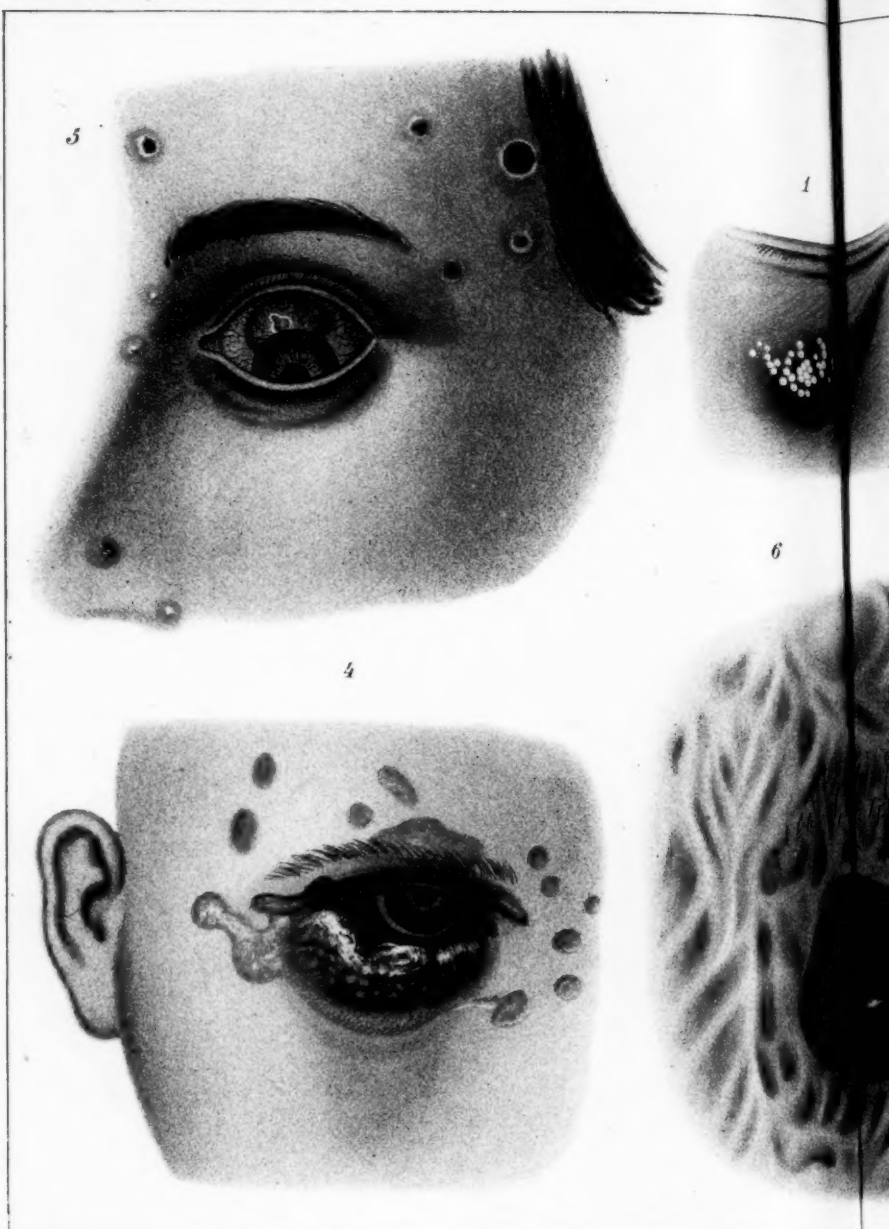
XV.—**Eye Symptoms as Aid in Diagnosis.** By EDW. MAGENNIS, M.D., D.P.H. Bristol: John Wright & Co., 1903.

This little, well-printed, 16mo volume of 84 pages text, 12 of "Some Ophthalmic Terms and Their Meanings," and an alphabetical index of 12 pages, is designed to inform, with little loss of time, the very busy practitioner, in particular the "hard-worked, ill-requited body—the Irish Poor-Law Medical Officers,"—of the significance and importance on prognosis and treatment of eye symptoms that may occur in their practice. The object of the book is legitimate, opportune, and serves a good purpose. The vocabulary and detailed index enable the practitioner to find readily what he wants. H. K.

ANNOUNCEMENTS.

We have received the first (July, 1903) number of a new ophthalmic journal, *The Ophthalmoscope*, a monthly review of current ophthalmology. Editor, Sydney Stephenson (London); subeditor, C. Devereux Marshall (London); correspondents: Major H. Herbert (East Indies), Dr. Charles A. Oliver (U. S.), Dr. A. Darier (France), and others. Annual subscription, 10/6. London: Geo. Pulman & Sons, 24–26 Thayer St., W.

The *next International Ophthalmological Congress* will be held at Lucerne, Switzerland, on September 19, 20, and 21, 1904. Circulars of invitation will soon be sent out.



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Verlag v. J. F. Bergmann, Wiesbaden.